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**FLORA OF PANAMA<sup>1</sup>**

**Part V, Fascicle 4**

**FAMILY 83. LEGUMINOSAE<sup>2</sup>**

**SUBFAMILY PAPILIONOIDEAE (in part)<sup>3</sup>**

BY JOHN D. DWYER<sup>4</sup>

*Lonchocarpus* BY F. I. HERMANN

*Trees, shrubs or herbs, occasionally armed. Leaves often alternate, pari- or imparipinnate, frequently 3-foliolate, rarely 1-foliolate; stipules usually present; stipelles mostly present. Inflorescences usually racemose or paniculate, often axillary. Flowers papilionaceous, rarely actinomorphic; hypanthium more or less campanulate, the teeth 5, the carinal tooth often the longest; petals 5, disposed as an upper vexillum or standard, two alae or wing petals, and 2 carinal petals coherent apically, occasionally united in part with the wing petals and enclosing the androecium and the gynoecium, occasionally rostrate or coiled at the apex; stamens 10, rarely 9 or less, occasionally free, usually monadelphous or diadelphous, the free filaments equal or often alternating long and short, the anthers monomorphic or dimorphic; ovary 1-carpellate, often surrounded by a glandular disk, 1- to several-ovulate, the stigma capitate or lateral, often enlarged, occasionally bearded. Fruits mostly dehiscent along 2 sutures, often pluri-loculate by the development of septa, occasionally indehiscent and samaroid, drupaceous or lomentaceous; seeds 1-several, often arillate, exalbuminous, the radicle of the embryo curved.*

Of the subfamilies of *Leguminosae*, the *Papilionoideae*, whether regarded on

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<sup>1</sup>The Flora of Panama by Robert E. Woodson, Jr. and Robert W. Schery and Collaborators should be cited as: *Ann. Missouri Bot. Gard.*, with volume number, pagination and date of the Annals.

<sup>2</sup>Continued from *Ann. Missouri Bot. Gard.* **38**: 94. 1951 (*Flora of Panama* **5**(3): 394).

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*ANN. MISSOURI BOT. GARD.* **52**: 1-54. No. 1. 1965.

a world-wide basis or locally in Panama, contains the greatest number of genera and species and the largest representation of plants economically important, as food, drugs, timber or dyes.

The following publications were found helpful in the preparation of this work:

Amshoff, G. J. H., On South American *Papilionaceae*. Med. Bot. Mus. Herb. Rijksuniv. Utrecht **52**: 1-71, fig. 1-4. 1939.

Amshoff, G. J. H., *Papilionaceae* in Pulle, Flora of Suriname **2**(2): 1-257. 1939.

Auctores, *Papilionaceae* in Flore du Congo Belge et du Ruanda-Urundi (Publ. I.N.É.A.C.), Spermatophytes **4**. 1953, **5** & **6**. 1954.

Baillon, H., Légumineuses in Baillon, Histoire des Plantes **2**: 21-384, fig. 15-157. 1870.

Bentham, G., *Papilionaceae* in Martius, Flora Brasiliensis **15**(1): 1-216, tab. 1-56. 1859, 217-350, tab. 57-127. 1862.

Burkart, A., Las Leguminosas Argentinas Silvestres y Cultivadas, 1943.

De Candolle, A. P. Mémoires sur la Famille des Légumineuses. 1825.

De Candolle, A. P., *Leguminosae* in DC., Prodr. **2**: 93-524. 1825.

Ducke, A., As Leguminosas da Amazonia Brasileira (Notas sobre Flora Neotrópica—II). Bol. Técn. Inst. Agron. Norte (Belém) **18**: 3-248. 1949.

Macbride, J. F., *Mimoseae* in Macbride, Flora of Peru. Field Mus. Nat. Hist., Bot. Ser. **13**(3): 4-113. 1943.

Pellegrin, F., Les Légumineuses du Gabon. Mém. Inst. Étud. Centrafr. Brazzaville **1**: 1-248. pl. 1-8. 1949.

Perkins, J., The *Leguminosae* of Porto Rico. Contr. U. S. Nat. Herb. **10**: 133-220. 1907.

Pittier, H., Arboles y Arbustos del Orden de Las Leguminosas. III. *Papilionaceas*. Bol. Min. R.R.E.E. **4-7**: 149-229. 1928.

Standley, P. C., Flora of the Panama Canal Zone. Contr. U. S. Nat. Herb. **27**: I-X, 1-416, fig. 1-7, pl. 1-66. 1928.

Standley, P. C., The Flora of Barro Colorado Island, Panama. Contr. Arnold Arb. **5**: 1-17, pl. 1-21, map. 1933.

Taubert, P., *Leguminosae* in Engler et Prantl, Nat. Pflanzenfam. **3**(3): 70-288, fig. 38-136. 1891-1894.

The complexity of the legumes has discouraged many taxonomists and they are often set aside in favor of other families. While the numbers of species in certain genera of the *Papilionaceae* (e.g. *Astragalus*, *Lupinus*, *Rhynchosia*, *Phaseolus*) may account in part for this attitude, equally disconcerting is the vagueness of generic lines in many complexes: *Dussia-Bowditchia-Diplotropis*, or *Phaseolus-Vigna-Pachyrrhizus*, or *Coumarouna-Dipteryx-Pterodon*.

One of the most discouraging features of studies such as the present, which is based primarily on herbarium materials, is the absence of fruiting specimens. The fruits of many genera are so drab and resemble each other so much in morphology and in texture that collectors tend to by-pass them in the field in favor of flowering material. I estimate that less than 10% of all tropical American collections include mature fruit. In many genera it is imperative to have both flowers and fruits

for critical identification, as in *Mucuna*, and in some species of *Machaerium*. With fruiting collections thus limited, the seed collections in herbaria are obviously poor. This is especially true in the tribe *Dalbergieae* whose fruits are indehiscent and are easily destroyed in the attempt to dissect the seeds.

## KEY TO TRIBES

- a. Stamens monadelphous or diadelphous.
  - b. Trees, tall shrubs or woody lianas; leaves pinnate (rarely 1-foliolate); calyx-teeth much reduced or absent; fruit indehiscent, often winged or drupaceous .....1. DALBERGIEAE
  - bb. Herbs, herbaceous or woody vines or shrubs; leaves usually 3-foliolate; calyx-teeth mostly conspicuous; fruits mostly dehiscent or rarely indehiscent.
    - c. Herbs, usually twining; flowers more than 1 cm. long, rarely smaller but then, with glandular-papillate leaves .....2. PHASEOLEAE
    - cc. Shrubs, or erect or sprawling herbs; flowers mostly small but the leaves not glandular-papillate (except *Dalea*).
      - d. Fruits not articulate.
        - e. Leaves with more than 3 leaflets .....3. GALEGAEAE
        - ee. Leaves 1- to 3-foliolate (except *Lupinus*).
          - f. Leaves pinnately 3-foliolate, the margins of the leaflets usually denticulate; anthers invariably monomorphic .....4. TRIFOLIEAE
          - ff. Leaves 1-foliolate or digitately 3- to 16-foliolate, the margins of the leaflets usually entire; anthers often dimorphic .....5. GENISTEAE
      - dd. Fruits articulate, or if not, hypogeal .....6. HEDYSAREAE
- aa. Stamens free .....7. SOPHOREAE

## Tribe 1. DALBERGIEAE

Taxonomically the fruits of the *Dalbergieae* are of paramount importance. Few-seeded, indehiscent, and samaroid or drupaceous, they provide excellent delimiting characters, principally at the generic level. Genera of the tribe are usually easy to identify when mature fruit is present. On the other hand, the wide divergence of opinion concerning the definition of generic lines on a world-wide basis stems principally from the matter of interpreting the morphological variation of the fruit. Bentham in his monograph of the *Dalbergieae* (cf. list below) has warned about the need of understanding the fundamental structural plan of the fruit before segregating a genus like *Drepanocarpus* from *Machaerium*.

The following are publications found useful in preparing the manuscript of the *Dalbergieae* of Panama.

- Bentham, G. Synopsis of the *Dalbergieae*, a Tribe of *Leguminosae*. Jour. Proc. Linn. Soc., Bot. **4** (Suppl.): 1-134. 1860.
- Ducke, A. Revision of the Species of the Genus *Coumarouna* Aubl. or *Dipteryx* Schreb. Trop. Woods **61**: 1-10. 1940.
- Johnston, I. M. The Botany of San José Island (Gulf of Panama). Sargentia **8**: I-II, 1-306, 2 fig., 17 pl. 1949.
- Pittier, H. On the Species of *Dalbergia* of Mexico & Central America. Jour. Wash. Acad. Sci. **12**: 54-64. 1922.

## KEY TO GENERA

- a. Fruits membranous, papyraceous or coriaceous, never drupaceous.
- b. Staminal tube cleft along the entire length; fruits with a flat wing, the seed distal or basal (except when wing much reduced, *Pterocarpus*).
- c. Leaves alternate.
- d. Anthers basifixed, dehiscing by 2 horizontal slits; pistil usually glabrous, occasionally moderately pubescent .....1. DALBERGIA
- dd. Anthers dorsifixed (except some spp. of *Machaerium*) dehiscing by 2 longitudinal slits; pistil usually densely hairy.
- e. Fruits not orbicular, the seminiferous area basal or apical.
- f. Calyx turbinate at the base; pericarp glabrous, the seed apical .....2. PLATYPODIUM
- ff. Calyx obtuse at the base; pericarp covered in whole or in part with few to many hairs or spines, the seed basal.
- g. Leaves not resinous-lepidote beneath; fruits 3-12 cm. long, the wing lacking a styler spine.
- h. Fruits 3-8 (-10) cm. long, the wing at least 4 times as long as wide .....3. MACHAERIUM
- hh. Fruits about 12 cm. long, the wing 3 times as long as wide .....4. PARAMACHAERIUM
- gg. Leaflets resinous-lepidote beneath; fruits 12-20 cm. long, the wing with an obvious styler spine .....5. CENTROLOBIUM
- ee. Fruits orbicular, the seminiferous area median, the wing rudimentary .....6. PTEROCARPUS
- cc. Leaves opposite .....7. PLATYMISCIUM
- bb. Staminal tube open only basally; fruits 4-angular, flat or terete, the seed median.
- c. Fruits 4-angular; ovary sessile .....8. PISCIDIA
- cc. Fruits flat or terete; ovary usually stipitate.
- d. Vexillum not auriculate; fruits terete .....9. MUELLERA
- dd. Vexillum usually auriculate; fruits flat .....10. LONCHOCARPUS
- aa. Fruits drupaceous.
- b. Anthers dehiscing by 2 terminal pores; calyx spathaceous .....11. FISSICALYX
- bb. Anthers dehiscing by longitudinal slits; calyx not spathaceous.
- c. Rachis of the leaves terete; hypanthium truncate at the base; calyxlobes scarcely evident, not glandular-punctate; ovary sparsely hairy (rarely glabrous); fruit not oleaginous .....12. GEOFFROEA
- cc. Rachis of the leaves alate; hypanthium rounded at the base; calyxlobes glandular-punctate; ovary glabrous; fruits oleaginous .....13. OLEIOPARON

## 1. DALBERGIA L. f.

DALBERGIA L. f., *Suppl. Pl. Syst. Veg.* 52. 1781, nom. gen. conserv.

*Amerimnon* P. Br., *Civ. Nat. Hist. Jam.* 288. 1756.

*Ecastaphyllum* P. Br., loc. cit. 299. 1756.

*Acouroa* Aubl., *Hist. Pl. Gui. Fr.* 753. 1775.

*Trees or shrubs. Leaves imparipinnate, the leaflets usually alternate, 3 to several, rarely 1; stipules ovate to subulate, small. Inflorescences paniculate (occasionally racemose), terminal or axillary. Flowers small, on short pedicels; bracts and bracteoles soon deciduous; hypanthium subgibbous, campanulate, the teeth 5; petals subequal, clawed, the carinal petals coherent along the lower margin; stamens 10, monadelphous or disposed in 2 fascicles of 5, the anthers minute, basifixed, dehiscing by 2 horizontal slits; ovary obviously stipitate, the style subulate, the stigma capitate or indeterminate. Fruits stipitate, oblong to rotund, occasionally*

constricted medially, wingless or with the wing surrounding the seminiferous area, lightly reticulate, the margin not thickened, the seeds solitary or rarely 2, flat.

About 200 species in the tropics of the Old World and the New World.

- a. Leaves several-foliolate; inflorescences patulous.
  - b. Carinal tooth of hypanthium not equal to or exceeding the fused portion in length; blade of vexillum subcuneate.
    - c. Hypanthium obviously carnose; ovary glabrous, fruit at maturity flat .....1. *D. CUSCATLANICA*
    - cc. Hypanthium petaloid to scarcely carnose; ovary rarely glabrous; fruit at maturity nummiform, at maturity turgid .....2. *D. MONETARIA*
  - bb. Carinal tooth of hypanthium equal to or exceeding the fused portion in length; blade of vexillum subreniform; pistil glabrous .....3. *D. RETUSA*
- aa. Leaves 1-foliolate; inflorescences compressed.
  - b. Leaflets ovate-oblong, oblong or oblong-rotund, rarely ovate, 2-8 cm. wide; flowers crowded; style about 2.5 mm. long .....4. *D. ECASTOPHYLLA*
  - bb. Leaflets ovate, up to 5 cm. wide; flowers patulous; style up to 1.7 mm. long .....5. *D. BROWNEI*

1. *DALBERGIA CUSCATLANICA* (Standley), Standley, Field Mus. Nat. Hist., Bot. Ser. **4**: 215. 1929.

*Amerimnon cuscatlanicum* Standley, Jour. Wash. Acad. Sci. **13**: 442. 1926.

*Dalbergia pacifica* Standley & Steyerl., Field Mus. Nat. Hist., Bot. Ser. **22**: 236. 1940.

*Tree*, small. *Leaves* up to 22 cm. long; leaflets 12-14, oblong or lanceolate-oblong, 6-12 cm. long, 2.5-5 cm. wide, deltoid, short-acuminate or obtuse at the apex, membranous, concolor, smooth, reticulate, glabrous above, pilulose or sericeous beneath, the margin revolute, the secondary veins arcuate; stipules narrowly rectangular, about 1.5 cm. long, falcate at the apex. *Panicles* up to 5 cm. long, the branches stiff and thick, or slender and deflexed, up to 2 cm. long, the pedicels about 3 mm. long, slender, puberulent. *Flowers* with the hypanthium up to 5 mm. long, very carnose, drying black, the teeth subequal, oblong to rotund, 1-2 mm. long; vexillum obovate-oblong, about 15 mm. long, about 10 mm. wide, obtuse at the base, the claw about 0.5 mm. long, glabrous; wing petals narrowly falcate-oblong, up to 14 mm. long, up to 4.5 mm. wide, the basal auricle suborbicular, about 1 mm. long, glabrous, the claw about 4.5 mm. long; carinal petals subreniform, equal to the wing petals, the basal auricle about 1.5 mm. long, the claw about 4 mm. long; stamens monadelphous or diadelphous, glabrous, the sheath and filaments subequal in length, the anthers about 0.3 mm. long; ovary stipitate for 4 mm., glabrous, 4-ovulate, the style about 4 mm. long. *Fruits* with the stipe 1-2 cm. long, narrowly oblong, up to 12 cm. long, about 2 cm. wide, glabrous, occasionally glaucous, lustrous.

Guatemala, Costa Rica and Panama.

PANAMA: Bejuco, Allen 2457. PROVINCE UNKNOWN: R. S. Williams s. n.

The inflorescences of *D. cuscatlanica* are much more compressed than those of *D. retusa*. The rachis of its inflorescence is more stout and the fruits are obviously more plano-compressed than those of *D. monetaria*. The flowers are described as white.

## 2. DALBERGIA MONETARIA L. f., Suppl. Pl. Syst. Veg. 317. 1781.

*Securidaca volubilis* L., Sp. Pl. 707. 1753, pro parte.

*Ecastaphyllum monetaria* (L. f.) Pers., Syn. Pl. **2**: 277. 1807.

*Ecastaphyllum benthamianum* Miq., Linnaea **18**: 575. 1844.

*Dalbergia brownei* Schinz, Bull. Herb. Boiss. **6**: 731. 1898, non Jacq. 1756.

*Dalbergia volubilis* (L.) Urban, Repert. Sp. Nov. **16**: 136. 1919.

*Shrub* or small tree. *Leaves* with 3-5 leaflets, these elliptic, 4.5-15 cm. long, 2-7 cm. wide, the acumen up to 1.8 cm. long, the margins slightly callose, the blade thinly coriaceous, drying brown; petioles 1-2 cm. long, slender; rachises 3-10 cm. long, wiry, puberulent. *Inflorescences* axillary, the rachises about 2 cm. long, slender, puberulent. *Flowers* with the hypanthium gibbous-campanulate, about 1.7 mm. long, glabrous or puberulent, the teeth subequal, minute, about 0.6 mm. long; vexillum oblong-rotund, up to 7.5 mm. long, up to 3.2 mm. wide, the claw equal to the blade, glabrous; wing petals narrowly oblong, up to 5 mm. long, truncate, oblique at the base, the claw about 1.8 mm. long; carinal petals narrowly falcate-oblong, about 5 mm. long, obtuse, glabrous; stamens in 2 fascicles of 5, the sheath slightly longer than the filaments, glabrous, the anthers about 0.2 mm. long; ovary slender-stipitate for about 3 mm., puberulent marginally, the erect style about 1.5 mm. long, puberulent at the apex only. *Fruits* with the stipe about 0.5 cm. long, nummiform (when young), rotund at maturity, about 3.5 cm. long, lustrous, glabrous; seeds somewhat flat, up to 1.5 cm. long.

Known from Mexico, Central America, and northern South America.

COLÓN: Río Sirrí, Trinidad Basin, Pittier 4029.

Oort, in a critical study of the genus *Securidaca* (*Polygalaceae*) in Surinam (Med. Bot. Mus. Herb. Rijksuniv. Utrecht **36**: 677-685. 1939), discusses (pp. 678-679) the fact that the Linnaean type of *Securidaca* is *S. volubilis* L.; the type material consists of three sheets, one of which, according to Oort, contains a fragment of the legume *Nissolia*. Amshoff in Pulle's Flora of Suriname (**2**(2): 120. 1939) presumably regards the fragment of the legume as belonging to the genus *Dalbergia*, as she cites *S. volubilis* L. in the synonymy of *D. monetaria* L. f.

Pittier (in his key to the *Dalbergia* of Mexico, Jour. Wash. Acad. Sci. **12**: 55-56. 1922) describes *D. monetaria* as having 9 stamens. My floral dissections reveal a constant number of 10. *Dalbergia* appears to be exceptional in the *Papilionoideae* in having more species than any other genus with a constant number of 9 stamens (e.g. *D. sisso*, *D. melanocardium*, *D. glomerata*).

## 3. DALBERGIA RETUSA Hemsl., Diag. Pl. Nov. Mex. Centr.-Am. 8. 1878, non Baillon. 1884.

*Dalbergia lineata* Pittier, Jour. Wash. Acad. Sci. **12**: 63. 1922.

*Amerimnon lineatum* (Pittier) Standley, Jour. Wash. Acad. Sci. **13**: 442. 1923.

*Tree*. *Leaves* with 7-15 leaflets, these inequilaterally oblong or ovate-oblong, 2.5-12 cm. long, 2-7 cm. wide, shortly acuminate or obtuse, chartaceous to coriaceous,

lustrous, reticulate, glabrous to puberulent, the costa plane above, the margins revolute; stipules ovate, up to 0.7 cm. long; petioles 4-5 cm. long. *Panicles* axillary or terminal, the rachises 4-18 cm. long, puberulent, the branches few; bracts and bracteoles soon deciduous, the latter oblong, about 1 mm. long. *Flowers* with the hypanthium cupuliform, about 5 mm. long, glabrous, the teeth deltoid, 1.7-3.1 mm. long, the longer carinal tooth puberulent on the outside; floral parts glabrous; vexillum cucullate-subrotund, up to 13.5 mm. long, cordate or subreniform basally, the claw 3-4 mm. long; wing petals oblong, about 13 mm. long, about 5 mm. wide, venose; carinal petals subreniform, up to 12 mm. long; stamens monadelphous or diadelphous, the sheath 3.5-7 mm. long, the free filaments curving and upright, subulate, up to 5 mm. long, the anthers about 0.3 mm. long; ovary stipitate for about 4 mm., 4-ovulate, the style curved, 4-5.5 mm. long. *Fruits* with the stipe 3-10 mm. long, narrowly oblong, 6-13 cm. long, 1.5-2.2 cm. wide, cuneate, obtuse or subtruncate, cuneate basally, glaucous, 1 to 2 (-3)-seeded; seeds flat, oblong.

Known from Mexico, Nicaragua, Costa Rica, and Panama.

CANAL ZONE: Madden Dam, *Baker* 496; Ancón, *Harvey* 5183; across Canal from Balboa, *Mell* 2; Experimental Gardens, *Skeete* 551; Cerro Gordo, Culebra, *Standley* 25962. COCLÉ: Penonomé, *R. S. Williams* 425. DARIEN: La Palma, *Pittier* 6606. PANAMA: Sabanas, *Bro. Paul* 303; Chagres River, Alhajuela, *Pittier* 3531; Arraiján & Chorrera, *Allen* 4316; Matías Hernández & Juan Díaz, *Standley* 31961; without locality, *Hayes* 642.

The leaflets of *D. retusa* are quite variable in size, shape and texture with those of the Costa Rican collections being thicker, more obtuse or retuse at the apex, and often more oblique at the base. Presumably additional collections in Panama will have oblong-rotund leaflets like the Costa Rican *Standley & Valerio* 44124. Noteworthy is *Pittier* 6606, cited above, with fruits measuring up to 13 cm. in length and with the proximal third of the wing obviously narrower.

The wood of *D. retusa* is the famous *rosewood* or *cocobolo*. Record and Hess (*Timbers of the New World* 255. 1943) state: "Insofar as the structure, properties, and utility of the timber is concerned cocobolo from Panama to Mexico may be considered as one species, *D. retusa*." Record and Garratt, in discussing the economic importance of *cocobolo* (*Yale Univ., School For., Bull.* **8**: 1-42, 7 *pl.* 1923), stress the exploitation of *D. retusa* in Panama.

*D. retusa* Baillon (*Bull. Soc. Linn. Paris* **1**: 436. 1884) was applied to a collection from Madagascar and is an earlier homonym of *D. retusa* Hemsl.

4. DALBERGIA ECASTAPHYLLA (L.) Taub. in Engl. & Prantl, *Nat. Pflanzenfam.* **3**(3): 335. 1894.—Fig. 133.

*Hedysarum ecastaphyllum* L., *Syst. Nat.* ed. 10, 1169. 1759.

*Ecastaphyllum brownei* Pers., *Syn. Pl.* **2**: 277. 1807, non Jacq. 1756.

*Ecastaphyllum ecastaphyllum* (L.) Britton, *Mem. Brooklyn Bot. Gard.* **1**: 55. 1918.

*Amerimnon ecastaphyllum* (L.) Standley, *Jour. Wash. Acad. Sci.* **15**: 459. 1925.

*Shrub* or small tree. *Leaves* 1-foliolate, the leaflets ovate or oblong, or oblong-rotund, 2.5-14 cm. long, 2-8 cm. wide, obtuse or obcordate at the apex, coriaceous, lustrous, puberulent, the costa often plane below, the margins somewhat irregular,

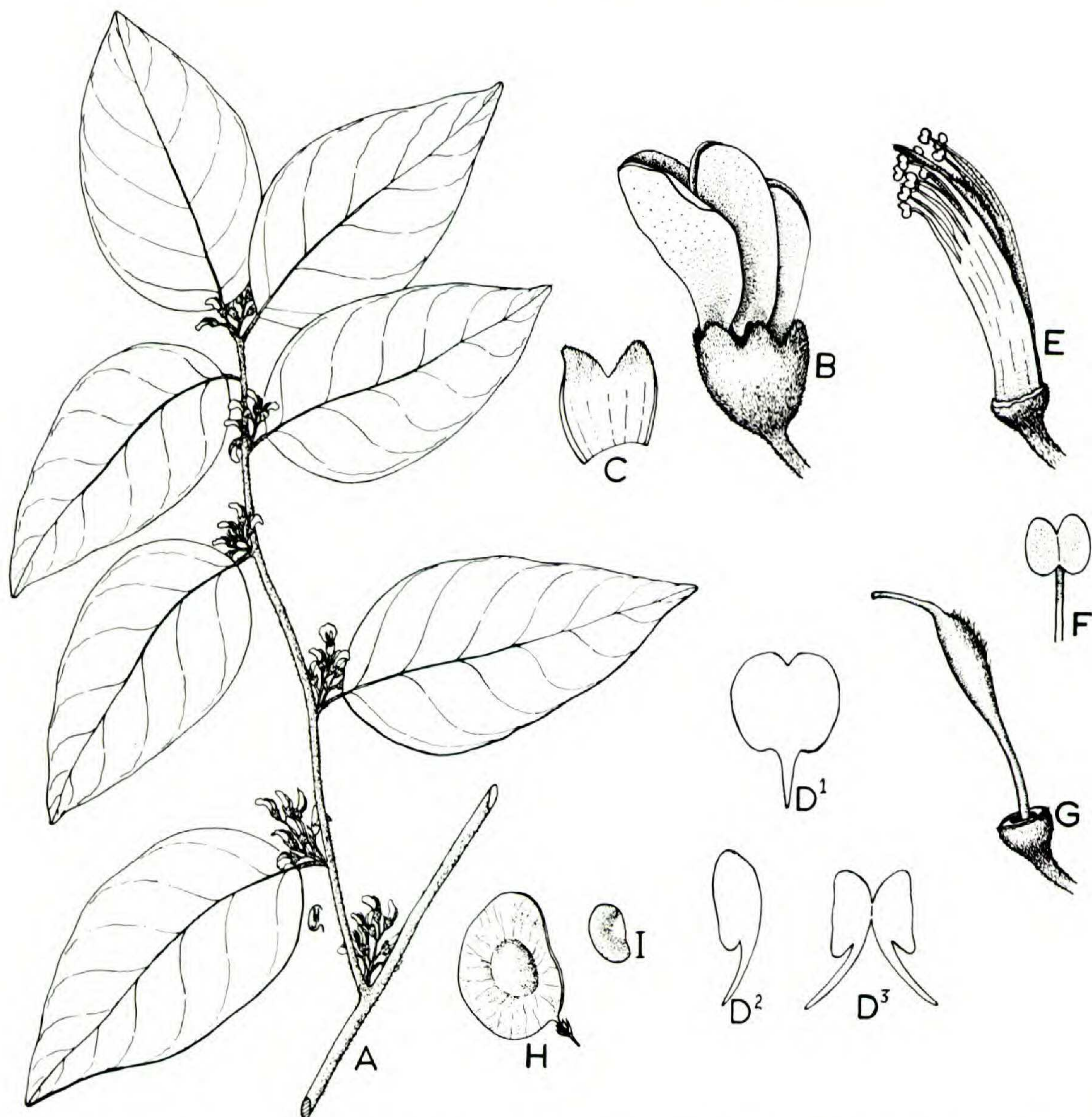


Figure 133. *DALBERGIA ECASTOPHYLLA* (L.) Taub.: A, flowering branch ( $\times 1$ ); B, flower ( $\times 8$ ); C, calyx in part ( $\times 8$ ); D, petals ( $\times 5$ ), D<sup>1</sup>, vexillum, D<sup>2</sup>, wing, D<sup>3</sup>, carina; E, androecium ( $\times 10$ ); F, anther and filament ( $\times 50$ ); G, gynoecium and receptacle ( $\times 10$ ); H, fruit and persistent calyx ( $\times 1$ ); I, seed ( $\times 1$ ). After von Wedel 447 (MO).

moderately revolute; petioles and petiolules 0.3-1 cm. long, slender; stipules ovate or widely subulate, up to 0.2 cm. long. *Inflorescences* congested in the axils, the slender rachises up to 2 cm. long, densely ferruginous-puberulent, the pedicels 1-3 mm. long; bracts rotund, ovate or reniform, 1-1.5 mm. long. *Flowers* with the hypanthium about 4 mm. long, aurous-puberulent, the teeth submammiform to deltoid, up to 1 mm. long, the carinal tooth usually narrower and longer; petals glabrous; vexillum suborbicular, up to 9 mm. long, the claw about 3 mm. long; wing petals oblong, up to 9.5 mm. long, obtuse, the claw about 3.3 mm. long; carinal petals gibbous, oblong-rotund, 6-7 mm. long, about 3 mm. wide; stamens monadelphous or in 2 fascicles of 5, the sheath 3-5 mm. long, the filaments up to 2 mm. long; ovary stipitate for 2-2.5 mm., moderately aurous-puberulent, the style about 1.7 mm. long. *Fruits* with the stipe about 0.3 cm. long, oblong-rotund to



narrowly oblong, 1.2-3.5 cm. long, up to 2.3 cm. wide, obtuse at the apex, obtuse to cuneate at the base, rarely constricted medially; seeds flat, oblong, up to 1.5 cm. long.

Tropical Florida, West Indies, Mexico, Central America, south to Rio de Janeiro, Brazil.

BOCAS DEL TORO: Isla Colón, *von Wedel* 518; Chiriquí Lagoon, *Hart* 182, *von Wedel* 898, 1138, 1332, 2059, 2104, 2810; without locality, *von Wedel* 447, 1676.

5. *DALBERGIA BROWNEI* (Jacq.) Urban, *Symb. Ant.* **4**: 295. 1905.

*Amerimnon brownii* Jacq., *Enum. Syst. Pl. Carib.* 27. 1760.

*Dalbergia amerimnum* Benth., *Jour. Proc. Linn. Soc. Bot.* **4** (Suppl.): 36. 1860.

*Shrub* or tree, often densely branched. *Leaves* 1-foliolate, the leaflets ovate to ovate-oblong, up to 9.5 cm. long, up to 5 cm. wide, obtuse or tapering gradually, the acumen vague or obvious, variable at the base, coriaceous, lustrous, often subulate above, puberulent, the costa subplane or subimmersed above; petioles 0.3-1 cm. long; stipules ovate to widely subulate, up to 0.2 cm. long. *Inflorescences* cymose-paniculate, the rachises shorter than the leaves; pedicels about 1.5 mm. long, puberulent; bracts ovate or reniform-ovate, up to 1.5 mm. long; bracteoles oval to oblong-lanceolate, 0.6-1 mm. long; *Flowers* with the hypanthium about 4 mm. long, the teeth minute, the carinal tooth about twice the length of the others, up to 1.8 mm. long; vexillum narrowly oblong to rectangular, up to 9 mm. long; wing petals narrowly oblong, up to 9.5 mm. long, obtuse, the claw about 3.5 mm. long; stamens monadelphous, the filaments and the sheath subequal in length; ovary stipitate for 2-4 mm. glabrous to minutely puberulent, the style about 1.5 mm. long. *Fruits* stipitate for about 0.3 cm. long, oblong-rotund to narrowly oblong, 1.2-3.5 cm. long, up to 2.5 cm. wide, obtuse at the apex, obtuse to cuneate basally, flat, rarely constricted medially, smooth, lustrous; seeds flat, oblong or oblong-rectangular, up to 1.5 cm. long.

Florida, West Indies, Mexico, Central America, and throughout South America.

BOCAS DEL TORO: Chiriquí Lagoon: *von Wedel* 2374, 2436, 2547; Isla Colón, *von Wedel* 502. CANAL ZONE: Victoria Fill near Miraflores Lake, *Allen* 1758; Gatun Station, *Hayes* 1012; Fort Randolph, *Maxon & Harvey* 6503; *Standley* 28610; France Field, *Standley* 30304; Fort Sherman, *Johnston* 1765; *Standley* 30931; Balboa, *Standley* 32148. COLÓN: Fato & Playa de Damas, *Pittier* 38341. PANAMA: San José Island, *Erlanson* 8, *Johnston* 516; Paitilla, *Standley* 26259, 30790; Taboga Island, *Standley* 27956. VERAGUAS: Isla de Coiba, *Dwyer* 1667.

## 2. PLATYPODIUM Vogel

PLATYPODIUM Vogel, *Linnaea* **11**: 420. 1837.

*Callisema* Benth. ex Steud., *Nom. Bot. ed. 2*, **1**: 258. 1840.

*Trees* small, unarmed. *Leaves* imparipinnate, the leaflets alternate or subopposite, oblong, the secondary veins numerous; stipules minute, caducous. *Racemes* lax, disposed in the upper axils; bracts and bracteoles small, deciduous. *Flowers*

with the calyx turbinate, the 5 teeth bilabiate disposed, the upper teeth coherent almost to the apex; vexillum large, orbicular; wing and carinal petals oblong or obovate, the carinal petals shorter; stamens 10, with usually the vexillar and carinal filaments relatively free, the remaining disposed in 2 fascicles of 4, the anthers versatile; ovary with the stipe obviously elongate and surrounded by a glandular disk, the style glabrous, the stigma small, terminal. *Fruits* indehiscent, samaroid, glabrous, the seminiferous area distal, subligneous, the wing (expanded stipe) oblong, coriaceous, venose; seeds 1-2, oblong, reniform, the rostellum hard, conical.

A small genus known from Panama, Venezuela, Brazil, Colombia, and Peru.

1. *PLATYPODIUM ELEGANS* Vogel, *Linnaea* **11**: 420. 1837.—Fig. 134.

*Platypodium viride* Vogel, loc. cit. 422. 1837.

*Platypodium elegans* var. *major* Benth. in Mart., *Fl. Bras.* **15**(1): 262. 1862.

*Platypodium maxonianum* Pittier, *Contr. U. S. Nat. Herb.* **18**: 234. 1917.

*Tree*, small, the trunk with sinuate, convolute ridges. *Leaves* up to 20 cm. long, the leaflets 10-20, oblong, up to 7.5 cm. long, 1.5-3 cm. wide, the principal secondary veins about 25, arcuate, the margins thickened, the blade thinly coriaceous, puberulent below, lustrous above, the rachises about 7.5 cm. long; petioles up to 1.5 cm. long, puberulent. *Flowers* with pedicels about 4 mm. long; hypanthium campanulate, about 8.5 mm. long, pilulose within, the upper pair of teeth deltoid, about 3.3 mm. long, the lower 3 oblong to rotund, about 2 mm. long; vexillum obovate-rotund, about 18 mm. long, narrowly cuneate at the base; wing petals not seen; carinal petals reniform, up to 12.5 mm. long, the auricles obtuse, the claw obviously eccentric; stamens diadelphous, the sheath more than twice the length of the filaments, the anthers about 0.6 mm. long; ovary stipitate for about 5 mm., sparsely villose. *Fruits* with the stipe obviously long-winged and cuneate basally, the pedicels about 1 cm. long, the seminiferous area distal, obliquely oblong, up to 3 cm. wide, turgid, the veins prominulous, dense, oblique.

Panama and northern South America.

CANAL ZONE: Barro Colorado Island, *Aviles* 33, *Bangham* 388, *Carpenter* 39, 54, *Dwyer* 1448, *Kenoyer* 389, 596, *Shattuck* 1124, *Standley* 31299, *Wetmore & Abbe* 183, *Woodworth & Vestal* 550. CHIRIQUÍ: Comarca del Barú, *Stern & Chambers* 125; San Felix, *Pittier* 5229. DARIEN: El Real, *Stern, Chambers, Dwyer & Ebinger* 191.

The fruits with a winged stipe and a turgid distal seminiferous area bear a fancied resemblance to a tadpole and superficially suggest the fruit of *Schizolobium* (*Cassieae*) and *Paramachaerium*, although admittedly in the latter the seminiferous area is proximal. The trees bear abundant fruits which are soon deciduous. The wood yields a bright red sap and the flowers are white. *Carcuera*, *tigre*, and *canela* are common names. The type of *P. maxonianum*, located at the U. S. National Herbarium, is *Pittier* 5229.



Figure 134. *PLATYPODIUM ELEGANS* Vogel: A, flowering branch ( $\times 1$ ); B, flower ( $\times 3$ ); C, petals ( $\times 2$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium and receptacle ( $\times 5$ ); E, gynoecium and receptacle ( $\times 5$ ); F, fruit ( $\times 1$ ). A after *Hassler 7405* (MO); B-F after *Dwyer 191* (MO).

## 3. MACHAERIUM Pers.

MACHAERIUM Pers., Syn. Pl. **2**: 276. 1807.

*Shrubs*, trees or high-climbing woody lianas, the wood yielding orange or red sap. *Leaves* imparipinnate, the leaflets few to numerous, alternate; stipelles absent; stipules often spinescent. *Racemes* axillary or terminal, these often numerous, cymoid; bracts usually small; bracteoles usually persistent. *Flowers* small, often dense, the hypanthium truncate, the teeth very short, usually truncate or obtuse; vexillum broad, usually emarginate; wing and carinal petals coherent distally along the lower margin; stamens 10, monadelphous or diadelphous and often with 2 fascicles of 5 stamens, the anthers small, usually basifixed, dehiscing longitudinally; stipe of the ovary surrounded by a glandular collar, the style slender, the stigma scarcely differentiated. *Fruits* stipitate, flat, samaroid, the seminiferous area proximal, incrassate, the wing attenuate, reticulate, the seeds variable in shape.

A genus of approximately 300 species widely distributed in the tropics of the New World and the Old World. The Panamanian species of *Machaerium* fall naturally into two groups, one with multifoliolate leaves, and the other with few leaflets. Pittier's work on *Machaerium* of Mexico and Central America (Contr. U.S. Nat. Herb. **20**: 467-477. 1922) includes six species which occur in Panama, three of which are retained here. In Panama *Machaerium* is the largest genus of the *Dalbergieae*, challenged only by *Lonchocarpus* H.B.K.

- a. Fruit with the wing straight or slightly curved.
  - b. Leaves with 20-80 leaflets.
    - c. Leaflets palmately veined .....1. *M. CHAMBERSII*
    - cc. Leaflets pinnately veined.
      - d. Wing of the fruit relatively thick and not drying red.
        - e. Costa of the leaflets almost invisible above; seminiferous area of the fruit distinctly marginate on the upper margin .....2. *M. GLABRIPES*
        - ee. Costa of the leaflets obvious above; fruits not obviously marginate.
          - f. Leaflets 20-25.
            - g. Leaflets glabrous, 0.3-0.6 cm. wide; staminal sheath usually hairy distally .....3. *M. CIRRHIFERUM*
            - gg. Leaflets pubescent, 1-2.5 cm. wide; staminal sheath glabrous .....4. *M. BIOVULATUM*
          - ff. Leaflets 25-80, usually pubescent beneath.
            - g. Unarmed trees; rachis of the leaves up to 8 cm. long; hypanthium densely aurous-puberulent; staminal sheath pubescent .....5. *M. ARBORESCENS*
            - gg. Armed woody vines or trees; rachis of the leaves 4-15 (-30) cm. long; hypanthium glabrous (except few hairs on the teeth); staminal sheath glabrous.
              - h. Wing and carinal petals falcate; free filaments of the stamens as long as or longer than the sheath; style 1.5-3 mm. long .....6. *M. ISADELPHUM*
              - hh. Wing and carinal petals not falcate; free filaments of the stamens less than half the length of the sheath; style 0.5-1.5 mm. long .....7. *M. PURPURASCENS*
    - dd. Wings of the fruit paper-thin and drying red.
      - e. Leaflets obtuse or rarely rounded at the apex, scarcely pubescent; hypanthium puberulent .....8. *M. CAPOTE*
      - ee. Leaflets rounded at the apex, densely pubescent; hypanthium glabrescent, except for scattered bulbous trichomes ....9. *M. LONGIFOLIUM*

- bb. Leaves with 5- to 16 leaflets.
- c. Leaflets 5-7, long-acuminate.
- d. Leaflets elliptic; flowers blue; bracteoles wider than long, not carinate; hypanthium glabrescent (except the teeth); upper margin in the wing petals straight; fruit with the wing up to 3 cm. wide, not conspicuously thickened on the lower margin .....10. *M. ARBOREUM*
- dd. Leaflets ovate or oblong, rarely elliptic; flowers white; bracteoles at most as wide as long, carinate; hypanthium minutely puberulent; upper margin of the wing petals oblique; fruit with the wing up to 1.8 cm. wide, the lower margin 1-2 mm. thick .....11. *M. DARIENSE*
- cc. Leaflets 6-16, not long-acuminate (except in *M. pachyphyllum*).
- d. Leaflets coriaceous, long-acuminate; rachis of the leaf about 2 mm. wide; flowers about 15 mm. long .....12. *M. PACHYPHYLLUM*
- dd. Leaflets chartaceous or membranous (subcoriaceous in *M. seemannii*), obtuse to short-acuminate; rachis of the leaf 0.5-1 mm. wide; flowers about 10 mm. long.
- e. Leaflets 6-13, oblong, lanceolate or elliptic, obviously acuminate, 0.7-2 (-7) cm. wide; vexillum subcordate at the base, the claw obscure; wing petals narrowly oblong, the blade almost as wide proximally as distally; at least one filament of the stamens pubescent .....13. *M. SEEMANNII*
- ee. Leaflets 9-11, oblong, obtuse or vaguely acuminate, 2-4 cm. wide; vexillum subcuneate at the base, the claw obvious; wing petals subrotund, the blade much wider distally than proximally; filaments of the stamens glabrous .....14. *M. WOODWORTHII*
- aa. Fruit with the wing very broadly lunate .....15. *M. LUNATUM*

1. *MACHAERIUM CHAMBERSII* Dwyer, sp. nov.

*Arbor?*; ramuli puberuli. *Folia* 20-30-foliata, alterna, inferiora subopposita, oblongo-trapeziformia, ad 2.5 cm. longa, ad 5.5 cm. lata, apice oblique subdeltoidea et vix apiculata, basi oblique truncata manifesteque inaequilateralia, venis 3 palmatis, in sicco utrinque viridia, praeter margines glabra et papyracea; rhachides tenues, angulares et supra longitudinaliter carinati; petioli 1-10 mm. longi, glandulis basalibus 2 apice manifeste setaceis praediti; stipulae subreflexae, deltoideae, circa 3 mm. longae et 2.5 mm. latae, acutae, crassae, glabrae, spinosae vel infra coriaceae apiceque rigidiores. *Flores* non visi. *Fructus* parte seminiferente manifeste plana, oblonga, arcuata, ad 0.9 cm. longa et 0.55 cm. lata, brunnea et appresso-puberula, margine inferiore leviter bicarinato; ala cultriformis, ad 4 cm. longa et circa 1 cm. lata, apice obliqua minuteque apiculata, margine superiore vix curvato inferioreque manifeste arcuato, tenuis, in sicco rubescens, papyracea, minute puberula, venis prominulis transversis irregulariterque dispositis.

DARIEN: El Real, *Stern, Chambers, Dwyer & Ebinger* 926 (MO, holotype).

I have been unable to find any species of *Machaerium* in the New World in which the secondary veins of the leaflets arise from the proximal position of the costa. Therefore I propose:

Sectio **Flabellinervata** Dwyer, sect. nov.: foliola venis secundariis flabelliformipalmatis a costae proximo parte orientibus.

Type species: *Machaerium chambersii* Dwyer.

The fruit of *M. chambersii* is strikingly like that of the Colombian *M. capote* Triana ex Dugand, reported in Panama for the first time in this paper.

The new species is named in honor of Kenneth Chambers with whom the author collected herbarium material in Panama.

2. *MACHAERIUM GLABRIPES* Pittier, Contr. U. S. Nat. Herb. **20**: 472. 1922.

*Tree*, small, the branchlets rimose, glabrous, armed, the spines scattered, cuneate, up to 0.3 cm. long. *Leaves* with 25-45 leaflets, these oblong, up to 1 cm. long, up to 0.3 cm. wide, truncate or obtuse at the apex, the mucro about 0.1 mm. long, obtuse at the base, the costa visible above only as an evanescent line, the principal veins numerous, irregular, evanescent above, the blade coriaceous, discolor, apparently glabrous (fide Pittier); rachises 4-7 cm. long, about 0.7 mm. wide; stipules deltoid, up to 0.3 cm. long, thin, scarious, glabrous. *Inflorescences* unknown. *Flowers* unknown. *Fruits* pedicellate for 3-4 mm., the pedicels ferruginous-pubescent, the stipe about 8 mm. long, the seminiferous area falcately disposed, up to 2 cm. long, up to 0.5 cm. wide, turgid, obviously marginate above, glabrous, tuberculate, the tubercules striate, the wing up to 4 cm. long, up to 1.5 cm. wide, obtuse or truncate, thin, the swollen margin about 0.5 mm. wide, drying tan, glabrous or pubescent.

Known only from Panama.

COCLÉ: Penonomé, R. S. Williams 410 (type).

According to Pittier (loc. cit. 472. 1922), *M. glabripes* is probably related to the Colombian *M. glabratum* but unfortunately the flowers of the former are unknown.

3. *MACHAERIUM CIRRHIFERUM* Pittier, Contr. U. S. Nat. Herb. **20**: 472. 1922.

*Machaerium arborescens* Pittier, loc. cit. 472. 1922.

*Machaerium merrillii* Standley, Field Mus. Nat. Hist., Bot. Ser. **8**: 15. 1930.

*Tree* or trailing shrub, the trunk usually armed; branchlets terete, frequently spiral, unarmed, often tendrillous (fide Pittier). *Leaves* often ericoid, the leaflets 30-60, oblong, up to 0.7 cm. long, up to 0.35 cm. wide, obtuse, the costa evanescent above, the main veins crowded, evanescent above, prominulous beneath, the blade thin-coriaceous, subequilateral, aurous-villose proximally and marginally above, densely villose to glabrous beneath; rachises up to 8 cm. long, densely ferruginous-villose; petioles up to 1.5 cm. long; stipules lanceolate, up to 0.3 cm. long, densely villose. *Panicles* terminal or axillary, 5-40 cm. long, ferruginous-tomentose. *Flowers* with the hypanthium 5-8 mm. long, carnose, densely puberulent, the carinal tooth 1.5-2 mm. long, rounded, the vexillar teeth broader and less rounded; vexillum orbicular, about 8.5 mm. long; wing petals obliquely oblong, about 7 mm. long, rounded at the apex, oblique at the base, ciliate at the claw; carinal petals reniform, about 6 mm. long, rounded at the apex, the claw obviously eccentric, ciliate; staminal sheath about 3 mm. long, ciliate, the filaments up to 1 mm. long; ovary obviously stipitate, pilose, the style about 0.6 mm. long. *Fruits* sessile, up to 1.6 cm. long, up to 1.5 cm. wide, the golden hairs dense, up to 1.5

cm. long, the wing cultriform, up to 3 cm. long, up to 1.7 cm. wide, obtuse, sparsely pilose.

Known only from Panama.

COCLÉ: Penonomé: *Williams* 409 (type), 416 (type of *M. arborescens*); Río Las Lajas, *Allen* 1606.

The flowers of both *M. cirrhiferum* and *M. arborescens* are described as lavender. While *M. merrillii*, unlike *M. arborescens*, has stiff hairs on the seminiferous area of the fruit, it is so similar to *M. cirrhiferum* in other respects that I have not hesitated to reduce it to synonymy.

4. *MACHAERIUM BIOVULATUM* Micheli, *Mém. Soc. Phys. Hist. Nat. Genève* **34**: 265, *pl. 15*. 1903.

*Machaerium acanthothrysus* Pittier, *Contr. U. S. Nat. Herb.* **20**: 473. 1922.

*Shrub* or tree. *Leaves* with 9-18 leaflets, these equilateral, oblong, obovate-oblong, 2.5-8 cm. long, 1.4-2.5 cm. wide, deltoid or rounded, often emarginate, thinly coriaceous, concolor, glabrescent to moderately villulose above and below; petioles 2-4 mm. long, the rachises up to 16 cm. long; stipules erect or deflexed, up to 8 mm. long, very variable in texture and pubescence. *Panicles* terminal and up to 20 cm. long, or shorter and axillary, or disposed as several short (up to 2 cm. long) racemes in the axils, the rachis and branches aurous-puberulent, the flowers dense, sessile or with the pedicels about 2 mm. long; bracteoles suborbicular, 1.3-3 mm. long, aurous-villulose. *Flowers* with the hypanthium up to 5.5 mm. long, aurous-puberulent, the upper teeth evanescent, the lower broadly deltoid, 0.3-1 mm. long; vexillum erect, suborbicular 8-9 mm. long, often with 2 linear callosities below the middle, aurous-villulose; wing petals falcately oblong, 8-12 mm. long, the auricle rounded, the claw curved, sparsely villose; carinal petals falcately subrotund, 7-10 mm. long, sparsely aurous-pilose; stamens monadelphous, the sheath about 7 mm. long, the filaments upright, 3-4.7 mm. long; ovary long-stipitate, falcate, densely aurous-villose, 1-ovulate, the style 3.5-4 mm. long, pubescent beneath. *Fruits* stipitate for 3-9 mm., the seminiferous area falcately oblong, 2.2-5 cm. long, about 1 cm. wide, tuberculate, the soft elongate hairs mixed with bulbous-based trichomes, the wing occasionally subhemispherical, up to 6 cm. long, obtuse, the upper margin straight, the lower curved.

Mexico and Central America.

CANAL ZONE: Las Cascadas Plantation, Summit, *Standley* 29958. COCLÉ: half mile below the village of El Valle, *Dwyer* 1806. PANAMA: Río Mamoni, *Duke* 5679.

An excellent plate (tab. 15) accompanies Micheli's original description. All pistils dissected proved to be 1-ovulate, thus calling into question the appropriateness of Micheli's specific epithet. The flowers are purple, tinged with pink, with the vexillum with a green spot within.

5. *MACHAERIUM ISADELPHUM* (E. Meyer) Standley, Jour. Wash. Acad. Sci. **15**: 459. 1925.

*Drepanocarpus isadelphus* E. Meyer, Nov. Act. Acad. Leop.-Carol. **12**: 807. 1824.

*Drepanocarpus microphyllus* E. Meyer, loc. cit. 808. 1824.

*Nissolia aculeata* DC., Prodr. **2**: 258. 1825.

*Machaerium angustifolium* Vogel, Linnaea **11**: 193. 1837.

*Machaerium affine* Benth., Comment. Legum. Gen. 34. 1837.

*Machaerium isadelphum* (E. Meyer) Amshoff, Med. Bot. Mus. Herb. Rijksuniv. Utrecht **52**: 53. 1939.

*Shrub*, woody liana or tree; branchlets often spirally coiled, armed, the spines subulate, up to 0.4 cm. long, glabrous. *Leaves* with subsessile leaflets, these up to 80, oblong, 0.5-4.5 (-10) mm. long, 0.2-1.3 (-3) mm. wide, obtuse, mucronulate, the costa plane and subevanescent above, the blade stiff, thinly coriaceous, curled, glabrous to sparsely pilose above, minutely puberulent to pilose beneath; rachises 30-40 cm. long, ferruginous; petioles 0.5-2 cm. long, ferruginous; stipules widely subulate, up to 1 cm. long. *Panicles* terminal, up to 30 cm. long, the rachis terete, the branches arcuate, up to 3 cm. long, patulous, usually paired and subequal, subtended by reflexed spines (stipules?), the flowers 10-15 on the longer branches; bracteoles suborbicular, 1.5-3.5 mm. long, villose, with some trichomes up to 1.7 mm. long, obviously bulbous. *Flowers* with the hypanthium campanulate, about 5.5 mm. long, drying purple, glabrous, the teeth scarcely evident to mammiform, 0.5-0.8 mm. long, obtuse, the upper teeth usually united, truncate, the carinal teeth narrower; vexillum reflexed, suborbicular, 6.5-10 mm. long, glabrous or villosulose; wing petals falcately oblong, 7-8 mm. long, glabrous or villosulose, subdeltoid at the apex, attenuate at the base, the auricle obvious; carinal petals obovate or subreniform, 6-7 mm. long, obtuse, the upper margin straight, the hairs few along the lower margin, the claw strongly eccentric; stamens monadelphous or diadelphous, the sheath curved, 4-5 mm. long, glabrous, the filaments more than one half the length of the sheath, the anthers about 0.6 mm. long; ovary stipitate for about 3 mm., densely sericeous, the style 1.5-3 mm. long. *Fruits* with the seminiferous area flat or scarcely turgid, falcately oblong, 1.2-5 cm. long, about 0.8 cm. wide, the wing cultriform, about 5 cm. long.

Panama and northern South America.

CANAL ZONE: Barro Colorado Island: *Shattuck 21, Woodworth & Vestal 584; Balboa, Standley 25500; Cerro Gordo near Culebra, Standley 26039; Gamboa, Standley 28318, 31922; Las Cruces Trail, between Fort Clayton and Corozal, Standley 29143; Darien Station, Standley 31550. CHIRIQUÍ: Boquete, Terry & Terry 1651. PANAMA: Punta Paitilla, Standley 26233; Matías Hernández, Juan Díaz, Standley 31975. VERAGUAS: Santiago, Allen 1080.*

Macbride (Field Mus. Nat. Hist., Bot. Ser. **13**(3):276. 1943) considers the valid name of this species to be *M. aculeatum* (DC.) Raddi. Inasmuch as De Candolle (loc. cit. 258. 1825) described this as *Nissolia aculeata* in 1825, Macbride would seem to err in suggesting that Raddi effected the new combination in 1820, five years before De Candolle described the species. Unfortunately I have been unable to locate a copy of the publication (Mem. Soc. Ital. Sci. Modena **18**: 598. 1820) cited by Macbride, in which Raddi presumably effected the new combination.



Assuming that Macbride is in error, *Drepanocarpus isadelphus* and *Drepanocarpus microphyllus*, both published in 1824, would seem to have priority. Since both species were described in the same publication by E. Meyer (loc. cit. 1824), I have elected to retain the specific name *isadelphus*, as it occurs on an earlier page than *microphyllus*. The flowers are described as pale blue to lavender.

7. *MACHAERIUM PURPURASCENS* Pittier, Contr. U. S. Nat. Herb. **20**: 474. 1922.

*Vine*, woody and thorny; branchlets purple, often spirally coiled, armed, the spines few, uncinata, up to 0.3 cm. long, usually alate, puberulent. *Leaves* with 10-70 leaflets, these ovate-oblong to oblong, up to 4.5 cm. long, up to 1.3 cm. wide, obtuse and mucronulate, the costa subimmersed above, the veins numerous, pinnate, evanescent above, the blade subcoriaceous, often chocolate and glabrous to sparsely pilose above, the hairs up to 1.3 mm. long, often densely aurous-pilose marginally; rachises 4-30 cm. long; petioles 1-2 cm. long, densely aurous-lanulate; stipules deltoid, 4-5 mm. long, spinoid above. *Panicles* terminal or axillary, up to 15 cm. long; bracteoles suborbicular, up to 1 mm. long. *Flowers* with the hypanthium 2-3 mm. long, drying lustrous-purple, glabrous except for the marginally puberulent teeth, the teeth scarcely evident, up to 0.8 mm. long; vexillum obreniform or subrotund, 4-4.5 mm. long, truncate or bilobed at the apex, widely auriculate at the base, sericeous on the outside; wing petals obliquely oblong or obovate-oblong, the flexure proximal, 4-5 mm. long, about 3 mm. wide; stamens disposed in 2 fascicles of 5, the sheath and the filaments subequal in length, 2-3 mm. long, the anthers up to 0.6 mm. long; ovary stipitate for 1-2 mm., about 5 mm. long, falcate, the hairs dense, short, the style up to 0.7 mm. long. *Fruits* stipitate for about 0.4 cm., the seminiferous area up to 1.5 cm. long, up to 0.7 cm. wide, moderately aurous-villosulose, the wing cultriform, up to 3.5 cm. long, about 1 cm. wide, both margins curved, drying golden-brown, moderately pilose.

Apparently restricted to Panama.

CANAL ZONE: Barro Colorado Island, *Bailey & Bailey* 316, *Shattuck* 817, *Wetmore & Woodworth* 57, *Woodworth & Vestal* 327, 868, 896; east of Bella Vista, *Maxon & Valentine* 63939; Ancón, *Pittier* 2749; Fort Randolph, *Standley* 28705; Las Cascadas Plantation near Summit, *Standley* 29544; Fort Sherman, *Standley* 31805; Balboa, *Standley* 32131. COCLÉ: Penonomé, *R. S. Williams* 112, 413, 414, 415. COLÓN: France Field & Catival, *Standley* 30400. DARIEN: La Palma, *Pittier* 5495. PANAMA: Punta Paitilla, *Bro. Heriberto* 215, *Piper* 5122; San José Island, *Johnston* 970, 1073, 1378; Taboga Island, *Macbride* 2796, *Standley* 27064; Old French Cut, west of Chagres River, opposite Bohio, *Maxon* 4783; Río Tapia, *Standley* 26138; east of Río Tocúmen, *Standley* 26627. Province unknown: *Bailey & Bailey* 6, *Seemann* 464.

*Pittier* (loc. cit. 474. 1922) states that this is probably the species collected in Panama by *Hayes* (328) as well as by *Sinclair* and *Hinds*, and identified by *Hemsley* as *M. angustifolium* *Vogel*. The leaflets of *M. purpurascens* are larger and the inflorescences more compressed than those of *M. angustifolium*.

*I. M. Johnston* (*Sargentia* **8**: 155-156. 1949) describes in detail the spiral coiling habit of the stems, emphasizing the role of the thorns in anchoring the plants as they climb on the adjacent vegetation. The cut stems ooze a red sap;

exceptionally thick stems (3-4 cm.) usually have anomalous vascular tissues. The flowers are pink-purple.

8. *MACHAERIUM CAPOTE* Triana ex Dugand, *Caldasia* **2**: 159, *pl.* (p. 161). 1943.

*Tree* variable in size; branchlets unarmed. *Leaves* up to 17 cm. long; leaflets 10-21, alternate, up to 6 cm. long, up to 2 cm. wide, often tapering abruptly to the obtuse and mucronulate tip, the costa immersed above, usually puberulent, the secondary veins about 15, the blade thinly coriaceous to chartaceous, minutely puberulent or glabrescent; petioles apparently less than 2 cm. long, slender, puberulent. *Racemes* or cymose-panicles shorter than the leaves, up to 9 cm. long; pedicels up to 5 cm. long, puberulent; bracteoles apparently briefly produced, concave, oblong-rotund, up to 1.8 mm. long, densely ferruginous-puberulent. *Flowers* with the hypanthium campanulate, about 2.5 mm. long, carinose, ferruginous-puberulent, the teeth barely visible; petals glabrous, the claws about equal to the blades; vexillum subrotund, about 7.5 mm. long; wing petals obovate-oblong, about 7.5 mm. long, obliquely rounded at the apex; carinal petals subreniform, about 6 mm. long, the claw strongly eccentric; stamens monadelphous, the filaments about equal to the sheath, the anthers about 0.2 mm. long; ovary stipitate for about 1.5 mm., densely aurous-villose, the style about 2 mm. long. *Fruits* stipitate for about 4 mm., the seminiferous area flat, falcately and narrowly oblong, about 2 mm. long, rounded or obtuse, up to 1 cm. wide, paper-thin, moderately aurous-puberulent.

Panama and Colombia (Departments of Cundamarca, Tolima, Huila and Atlántico).

DARIEN: El Real, *Duke* 5035, *Stern*, *Chambers*, *Dwyer* & *Ebinger* 890.

These are the first records of *M. capote* in Central America. Dugand claims authorship of the species on the score that Hoehne (*Fl. Bras.* **25**(3): 91. 1941 and *Bol. Agric. Ganaderia Dept. Atlántico* **2**: 28. 1935) did not validly publish the manuscript binomial of Triana in failing to include a Latin diagnosis. While Micheli's *M. biovulatum* seems to be a close relative of *M. capote*, the latter seems more akin to *M. chambersii*, although admittedly the venation of the leaflets of the latter is strikingly different. The flowers of *M. capote* are reported as yellow or reddish.

9. *MACHAERIUM LONGIFOLIUM* Benth., *Jour. Proc. Linn. Soc. Bot.* **4** (Suppl.): 55. 1860.

*Machaerium costaricanum* Pittier, *Contr. U. S. Nat. Herb.* **20**: 475. 1922.

*Shrub* or sprawling vine; branchlets often farinose (bases of deciduous trichomes). *Leaves* up to 17 cm. long; leaflets 22-44, narrowly oblong, up to 2 cm. long, about 1 cm. wide, acute or obtuse at the apex, the terminal cilia about 1 mm. long, the costa immersed above, the main veins crowded, evanescent beneath, the blade chartaceous to thin-coriaceous, villose, concolor; petioles up to 2 cm. long,

densely villose; rachises up to 13.5 cm. long, about 1.5 mm. wide; stipules reflexed, deltoid-subulate or uncinata, up to 10 mm. long, acute, glabrescent, indurate. *Panicles* either terminal and up to 50 cm. long, or panicles axillary and shorter, or racemes axillary, 2-6 cm. long, the flowers dense, the pedicels about 2 mm. long, puberulent; bracteoles ovate-orbicular, about 4 mm. long, the base extended as 2 callosities on the pedicel, the margin puberulent with a few, bulbous trichomes. *Flowers* with the hypanthium about 5 mm. long, carnose, rubescent and rugulose, glabrous except for a few bulbous trichomes, or occasionally the teeth marginally puberulent, the upper teeth evanescent, the 3 lower about 1 mm. long; vexillum orbicular, 8-9 mm. long, pilose on the outside; wing petals oblong, about 8 mm. long, cuneate at the base, pilose to glabrescent; carinal petals falcately oblong, about 8 mm. long, cuneate and pilose at the base; stamens in 2 fascicles of 5, the filaments less than  $\frac{1}{2}$  the length of the sheath, the anthers about 0.35 mm. long, subbasifixed; ovary stipitate for about 5 mm., falcate, pilose mostly on the margins, the style up to 1.5 mm. long. *Fruits* with the seminiferous area narrowly oblong, up to 1.5 cm. long, the wing cultriform, about 3 cm. long, oblique, slightly curved on both margins, chartaceous, drying tan, puberulent.

Nicaragua, Costa Rica, Panama, and apparently in northern South America.

DARIEN: El Real, Río Turia, pasture and edge of woods, *Stern, Chambers, Dwyer & Ebinger 794*.

This is the first collection of *M. longifolium* in Panama. Presumably this is the only Panamanian species of *Machaerium* with bulbous trichomes on the bracteoles and calyx. Field notes indicate that the flowers are white with green and purple markings.

10. *MACHAERIUM ARBOREUM* (Jacq.) Vogel, *Linnaea* **11**: 182. 1837.

*Nissolia arborea* Jacq., *Enum. Syst. Pl. Carib.* 27. 1762.

*Nissolia glabrata* Link, *Enum. Pl. Hort. Bot. Berol.* **2**: 221. 1822.

*Machaerium acuminatum* H.B.K. var. *latifolium* Benth., *Jour. Proc. Linn. Soc. Bot.* **4** (Suppl.): 65. 1860.

*Machaerium latifolium* (Benth.) Pittier, *Contr. U. S. Nat. Herb.* **20**: 470. 1922.

*Machaerium fruticetorum* Standley & Steyermark, *Field Mus. Nat. Hist., Bot., Ser.* **22**: 240. 1940.

*Shrub* or small tree; branchlets smooth, glabrous. *Leaves* with 5-7 leaflets, these elliptic to suborbicular, up to 9.5 cm. long, up to 4 cm. wide, the acumen up to 2 cm. long, the costa immersed above, the main veins about 7, immersed above, the blade chocolate beneath, glabrous to glabrescent; petioles 3-4 cm. long, glabrous; rachises about 6 cm. long. *Panicles* several per axil, up to 9 cm. long, the branches up to 3 cm. long; bracteoles broadly reniform, up to 3 mm. wide, pilulose above on the outside, sericeous within above the attachment scar. *Flowers* with the hypanthium up to 5.5 mm. long, ribbed, glabrescent below, minutely puberulent on the teeth, the latter subequal, deltoid to oblong, up to 1 mm. long, the carinal tooth much narrower; vexillum broadly obovate-deltoid, up to 9 mm. long, up

to 13 mm. wide, truncate at the base, densely aurous-pilose on the outside; wing petals oblong-rectangular, up to 8 mm. long, scarcely tapering at the base, sacculate-auriculate, aurous-pilose proximally; carinal petals sublunate, about 7.5 mm. long, densely pilose along the lower margin and at the middle, the short claw strongly eccentric; stamens monadelphous, the anthers 0.7-1.5 mm. long; ovary stipitate for about 2.5 mm., densely aurous-sericeous, the style 2-2.5 mm. long, curved. *Fruits* with the wing narrowly falcate or inequilaterally oblong, up to 8 cm. long, up to 1.8 cm. wide, obtuse or cuneate at the apex, apparently glabrous.

Mexico, Honduras, Costa Rica, and Panama.

CANAL ZONE: Barro Colorado Island, *Brown 177, Dodge 3480*; Tumba Vieja and Salamanca, *Steyermark & Allen 16746*.

Although the fruits of the Mexican, Costa Rican, and Honduras material of *M. latifolium* reach 10 cm. in length and 2.5 cm. in width, and thus seem larger than those of typical *M. arboreum*, there appears to be no substantial grounds for segregating *M. latifolium* as a distinct species. Material of *M. pittieri* Macbr., while bearing a close resemblance to *M. arboreum*, shows important floral differences; the claw of the wing petals of *M. arboreum* is attached submedianally at the base of the blade, whereas the claw in *M. pittieri* is strongly eccentric; in the former species the lower margin of the blade of the wing petals is rounded while in *M. Pittieri* it is strongly curved. The flowers of *M. arboreum* are described as blue.

11. *MACHAERIUM DARLENSE* Pittier, *Contr. U. S. Nat. Herb.* **20**: 470. 1922.—  
Fig. 135.

*Tree*, scandent in habit, or shrub. *Leaves* with 4-7 leaflets, these subelliptic, ovate or obovate-oblong, 4-14 cm. long, 1.5-7 cm. wide, long-acuminate, the costa immersed above, the main veins 6-16, stiff-chartaceous to subcoriaceous, equilateral, reticulate, glabrous above, pubescent along the costa below; petioles up to 3.5 cm. long; rachises 3-9.5 cm. long; stipules cuneate, up to 0.7 cm. long, cleft, curved. *Panicles* axillary or terminal, up to 8 cm. long, the branches often paired, up to 2 cm. long, wiry, sharply ascending, the flowers densely capitate; bracts ovate, up to 3 mm. long; bracteoles orbicular, up to 2 mm. long, the hairs short and rigid. *Flowers* with the hypanthium 5-6 mm. long, puberulent mostly on the teeth, the latter scarcely discernible, or up to 1 mm. long, very broad at the base; vexillum orbicular, about 7 mm. long, cuneate at the base, the short claw densely puberulent; wing petals falcately oblong, about 8 mm. long, the auricle about 1 mm. long, the lower margin strongly curving, narrower and arcuate near the claw, densely aurous-villose proximally especially below the middle, the claw obviously eccentric; carinal petals subreniform, about 8 mm. long, venose, carnose, densely villose along the lower margin, the claw obviously eccentric; stamens monadelphous or diadelphous, the filaments longer than the sheath, the anthers 0.5-0.6 mm. long; ovary stipitate for about 4 mm., aurous-villose, the style 0.8-1.8 mm. long. *Fruits* stipitate for about 7 mm., the stipe ferruginous-puberulent, the seminiferous

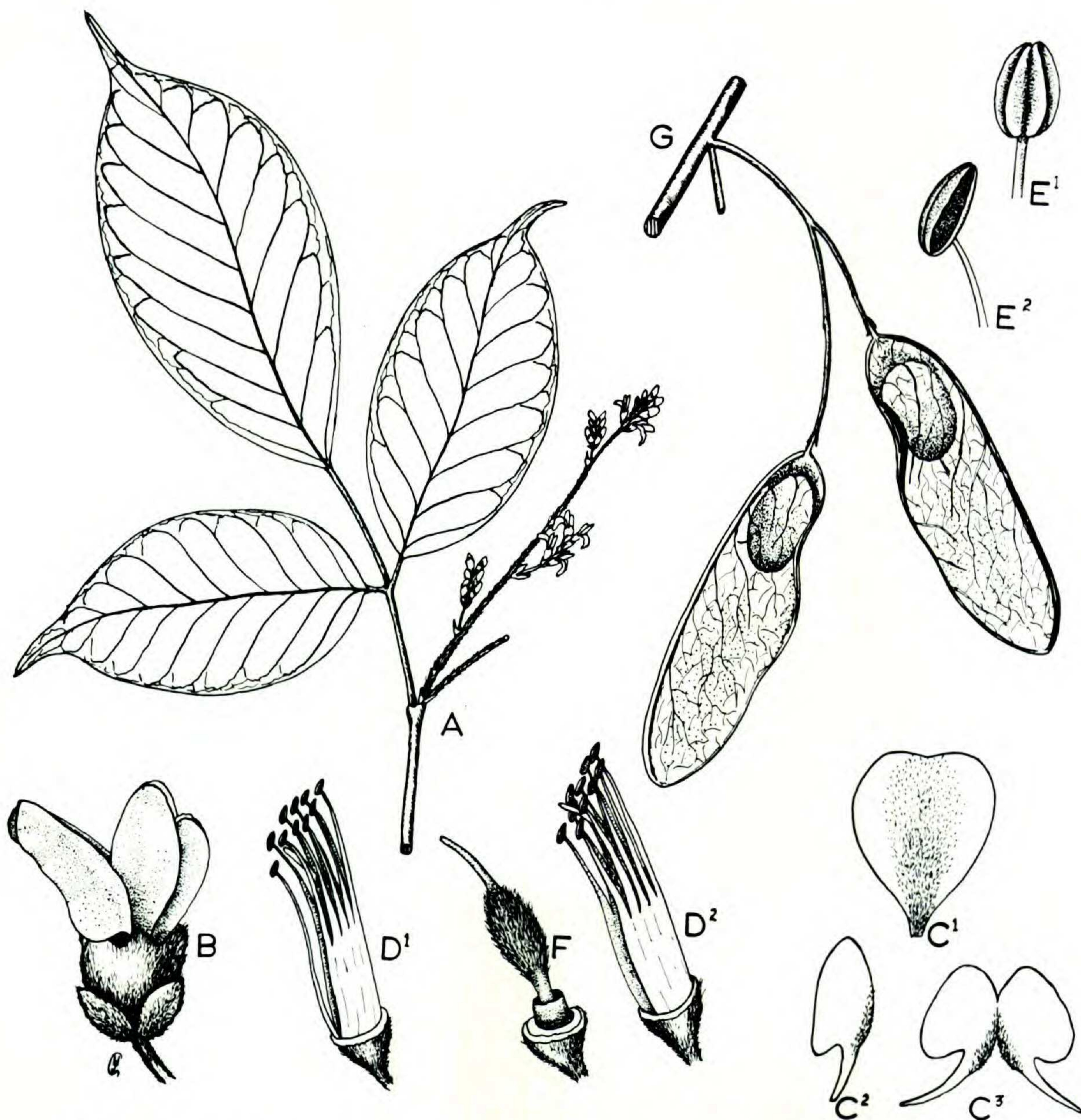


Figure 135. *MACHAERIUM DARIENSE* Pittier: A, flowering branch ( $\times 1$ ); B, flower ( $\times 7$ ); C, petals ( $\times 5$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium ( $\times 10$ ), D<sup>1</sup>, diadelphous, D<sup>2</sup>, monadelphous; E, stamens (much enlarged), E<sup>1</sup>, anther showing dehiscence, E<sup>2</sup>, anther showing filament attachment; F, gynoecium and receptacle ( $\times 10$ ); G, fruit ( $\times 1$ ). After Skutch 4795 (MO).

area about 2.5 mm. long, about 1.3 cm. wide, flat, not strongly falcate, the wing cultriform, 4-9 cm. long, 1-2.6 cm. wide, oblique with the ventral margin broadly contracted toward the base, the dorsal margin 1-2 mm. wide, reticulate, glabrous or sparsely villosulose.

Costa Rica and Panama.

CANAL ZONE: Barro Colorado Island, Killip 40014. DARIEN: La Palma, Pittier 5497 (type).

The flowers are described as white.

12. *MACHAERIUM PACHYPHYLLUM* Pittier, Contr. U. S. Nat. Herb. **20**: 469. 1922.  
*Machaerium marginatum* sensu Johnston, Sargentia **8**: 154. 1949, non Standley, Jour. Wash. Acad. **14**: 95. 1924.

*Tree*, small, or sprawling shrub or woody vine; branchlets well armed, the spines subulate, 0.5-1.5 cm. long, uncinata, often only the bases persistent. *Leaves* with 14-17 leaflets, these ovate to oblong, 3.5-18 cm. long, 1.8-6 cm. wide, the acumen up to 2.5 cm. long, the costa immersed above, the blade glabrous to densely ferruginous-puberulent, coriaceous, lustrous above, the margin often vaguely irregular; petioles stout, 7-8 cm. long, the indumentum variable; rachises up to 17 cm. long. *Panicles* axillary or terminal, up to 60 cm. long, the branches unequal, several per axil, up to 16 cm. long; bracteoles orbicular, about 5.5 mm. long. *Flowers* about 15 mm. long, the hypanthium about 8 mm. long, densely tomentose, the teeth unequal, deltoid, 1.8-3 mm. long, the carinal tooth usually longer and thicker; vexillum orbicular, about 12 mm. long, densely puberulent; wing petals falcately oblong, about 14 mm. long, glabrous; carinal petals falcately oblong, usually shorter and narrower than the wing petals, obviously rostrate, glabrous; filaments up to 3.3 mm. long, the anthers about 0.5 mm. long; ovary stipitate for 2-5 mm., 3-4.5 mm. long, densely villosulose. *Fruits* with the seminiferous area oblong, up to 2 cm. long, about 1 cm. wide, aurous-puberulent with longer trichomes interspersed, the wing up to 2 cm. long, about 2 cm. wide, obtuse, reticulate, glossy, glabrescent to sparsely villosulose with a few trichomes persistent.

Costa Rica and Panama.

CANAL ZONE: Barro Colorado Island, *Kenoyer* 6721, *Standley* 40865, *Wilson* 78, *Woodworth & Vestal* 349; Chiva-Chiva Trail, *Piper* 5714; Las Cascadas Plantation, *Standley* 25721, 29614; Gamboa, *Standley* 28382, Fort Sherman, *Standley* 31059; Obispo, *Standley* 31791. COCLÉ: Penonome, *R. S. Williams* 397. PANAMA: Panama City, *Bro. Paul* 418; San José Island, *Johnston* 419, 769.

The material which I have seen in American herbaria labelled *M. marginatum* is *M. pachyphyllum*; the type of the latter is *R. S. Williams* 170 from El Salvador.

The leaves of *M. marginatum* are considerably larger, the bracteoles are oblong and have bulbous trichomes, and the flowers are only two thirds the length of those of *M. pachyphyllum*. The wing of the fruit of *M. pachyphyllum* is not obviously curved on either margin, in this respect differing from the fruits of those species of *Machaerium* in Panama with wide leaflets.

The flowers of *M. pachyphyllum* are reported to be white and tinged with red. I. M. Johnston (*Sargentia* **8**: 155. 1949) remarks on the climbing habit of *M. pachyphyllum* (*M. marginatum* sensu Johnston) on San José Island, the pole-like stems, which may be readily observed on Navy Road and at Marino, shedding their leaves in the middle of January, with the flowers appearing about a month later.

13. *MACHAERIUM SEEMANNII* Benth. ex Seem., Bot. Voy. Herald 110. 1853.  
*Machaerium campylocarpum* J. D. Sm., Bot. Gaz. **44**: 109. 1907.

*Liana*, giant and woody, or spreading shrub. *Leaves* with 6-13 leaflets, these

oblong-lanceolate, ovate, elliptic or oblong, 1.5-7.5 cm. long, 0.7-2.7 cm. wide, the acumen narrow and falcate, the costa plane or immersed above, the main veins 15-20, the blade thinly coriaceous, lustrous and dark-green above, usually sparsely pilose on the costa and margins; petioles 2-3 cm. long; rachises 5-5.8 cm. long. *Panicles* compressed, axillary, up to 5 cm. long, the shorter branches 3-7 per axil, puberulent and rough with persistent bracts, the latter rotund, up to 1 mm. long, densely puberulent; bracteoles subreniform, about 1.5 mm. long, puberulent. *Flowers* 5-20 per branch, distichous, the hypanthium shallow, 3-3.5 mm. long, densely puberulent, the teeth (except for the carinal tooth) evanescent; vexillum orbicular-oblong, about 8 mm. long, vaguely auriculate, appressed-sericeous, the claw about 6 mm. long; wing petals narrowly falcate, about 8 mm. long, densely aurous-villose on the outside; carinal petals subrotund, about 8.5 mm. long, aurous-villose; stamens monadelphous, the filaments about  $\frac{1}{2}$  the length of the sheath, villose (at least the median), the anthers 1-1.3 mm. long; ovary stipitate for about 2.5 mm., densely aurous-villose, the styles subulate, about 2 mm. long, pubescent toward the base. *Fruits* stipitate for about 0.7 cm., the seminiferous area usually turgid, up to 2 cm. long, up to 0.9 cm. wide, the wing cultriform, up to 4.5 cm. long, up to 2 cm. wide, reticulate, the veinlets prominulous, minutely aurous-puberulent, often powdery in appearance, the carinal margin about 1.5 mm. wide.

Honduras, Guatemala, Panama and Colombia.

CANAL ZONE: Gatun Lake, *Bangham* 435; Quebrada La Palma & Río Chagres, *Dodge & Allen* 17347; Barro Colorado Island, *Killip* 40010, *Shattuck* 126, *Standley* 31248, 40942, *Wetmore & Woodworth* 51, 60; Frijoles, *Piper* 5791; Las Cascadas Plantation, *Standley* 25703, 29624; Corozal, *Standley* 27348, 29135; Río Tapia, *Standley* 28130; Fort Sherman, *Standley* 31025; Darien Station, *Standley* 31613. CHIRIQUÍ: El Boquete, *Davidson* 733, *Terry & Terry* 1626; Cerro Vaca, *Pittier* 5310. COCLÉ: Paso del Adrado & Ola, *Pittier* 5094. COLÓN: France Field and Catival, *Standley* 30293. DARIEN: Río Chico, *Allen* 4604. PANAMA: San José Island, *Johnston* 1328.

The unique condition in *M. seemannii* of having one or more filaments of the stamens villose is noteworthy. Presumably the flowers vary from blue to black. I. M. Johnston (*Sargentia* **8**: 156. 1949) notes that the stems of his collection (1358) "oozed no gory juice," an unusual deficiency of the vascular tissue of a species of *Machaerium*.

14. *MACHAERIUM WOODWORTHII* Standley, *Contr. Arnold Arb.*, **5**: 81, *pl.* 12. 1933.

*Tree* (?), the twigs unarmed. *Leaves* imparipinnate; leaflets 9-11, alternate, oblong, up to 6 cm. long, 2-4 cm. wide, obtuse and vaguely acuminate, the costa immersed above, the main veins about 10, plane above, curving near the callose and subundulate margin, the blade chartaceous, concolor, minutely aurous-puberulent beneath; petiolules about 3 mm. long; petioles 3-4 cm. long; rachises 4-9 cm. long. *Panicles* axillary, 4-5 cm. long; bracteoles subtrapeziform, about 1.3 mm. long, obtuse, densely puberulent. *Flowers* sessile, the hypanthium urceolate, about 4 mm. long, aurous-puberulent, the teeth up to 0.5 mm. long, broadly obtuse; vexillum obovate-oblong, about 6.5 mm. long, about 4 mm. wide, rounded at the

tip, cuneate at the base, narrowly and abruptly flexed near the middle, glabrous; carinal petals subreniform, about 5 mm. long, the claw eccentrically attached, glabrous; stamens monadelphous, the filaments about  $\frac{1}{2}$  the length of the sheath, the anthers about 0.4 mm. long; pistil stipitate for about 2 mm., densely aurous-puberulent, the style about 0.8 mm. long. *Fruits* unknown.

Native to Panama.

CANAL ZONE: Barro Colorado Island, *Woodworth & Vestal* 422 (type).

Standley's remark (Carnegie Inst. Wash. Publ. **461**: 64. 1935), that his *M. rosescens* (type *Schipp* 1091, from British Honduras) is closely related to *M. woodworthii*, is noteworthy, but difficult to evaluate, in view of the paucity of material.

15. *MACHAERIUM LUNATUM* (L. f.) Ducke, Arch. Jard. Bot. Rio de Janeiro **3**: 151. 1922.

*Pterocarpus lunatus* L. f., Suppl. Pl. Syst. Veg. 317. 1781.

*Drepanocarpus lunatus* (L. f.) G. F. W. Meyer, Prim. Fl. Essequiboensis 238. 1818.

*Shrub*, woody vine, shrub or tree, the branchlets armed. *Leaves* with 8-20 leaflets, these oblong, 1.5-3.5 cm. long, 0.8-2 cm. wide, obtusely truncate, thin-coriaceous, glabrous at maturity, the costa often immersed above, the main veins crowded; petioles 1-2.5 cm. long; rachises 2-5 cm. long. *Panicles* terminal, up to 15 cm. long; stipules spiniform, subulate, up to 1 cm. long, reflexed, glabrous toward the tip; pedicels about 2 mm. long; bracteoles orbicular, 1.5 mm. long. *Flowers* with the hypanthium about 5 mm. long, glabrous to puberulent, venose within, the teeth evanescent, about 0.6 mm. long; vexillum subrotund, broader than long, about 7.5 mm. wide, villosulose, shortly auriculate at the base, the claw about 3.5 mm. long; wing petals oblong, about 8 mm. long, obtuse, truncate at the base; carinal petals subreniform, about 9 mm. long, glabrous; stamens monadelphous, the filaments about  $\frac{1}{2}$  the length of the sheath, the anthers about 0.65 mm. long, scarcely wider than the filaments; ovary stipitate for about 6 mm., densely sericeous to glabrescent, falcately oblong, the style about 3 mm. long. *Fruits* strongly lunate (appearing orbicular), 2-3 cm. long, 2-3 cm. wide, flat, rugulose, moderately puberulent.

Central America, West Indies, tropical South America and Africa.

CANAL ZONE: hills west of the Canal near Gatun, *Standley* 27292; Fort Randolph, *Standley* 28693; Darien Station, *Standley* 31616. CHIRIQUÍ: David, *Pittier* 3373. PANAMA: Mamoni River, *Pittier* 4585.

As the specific name suggests *M. lunatum* is readily recognized by its strongly curved fruits. The flowers are described as lilac or purple.

4. *PARAMACHAERIUM* Ducke

*PARAMACHAERIUM* Ducke, Arch. Jard. Bot. Rio de Janeiro **4**: 86. 1925.

*Trees*. *Leaves* imparipinnate; leaflets several, alternate, penni-nerved; stipules minute, soon deciduous. *Panicles* terminal, multi-flowered; bracts persisting; brac-



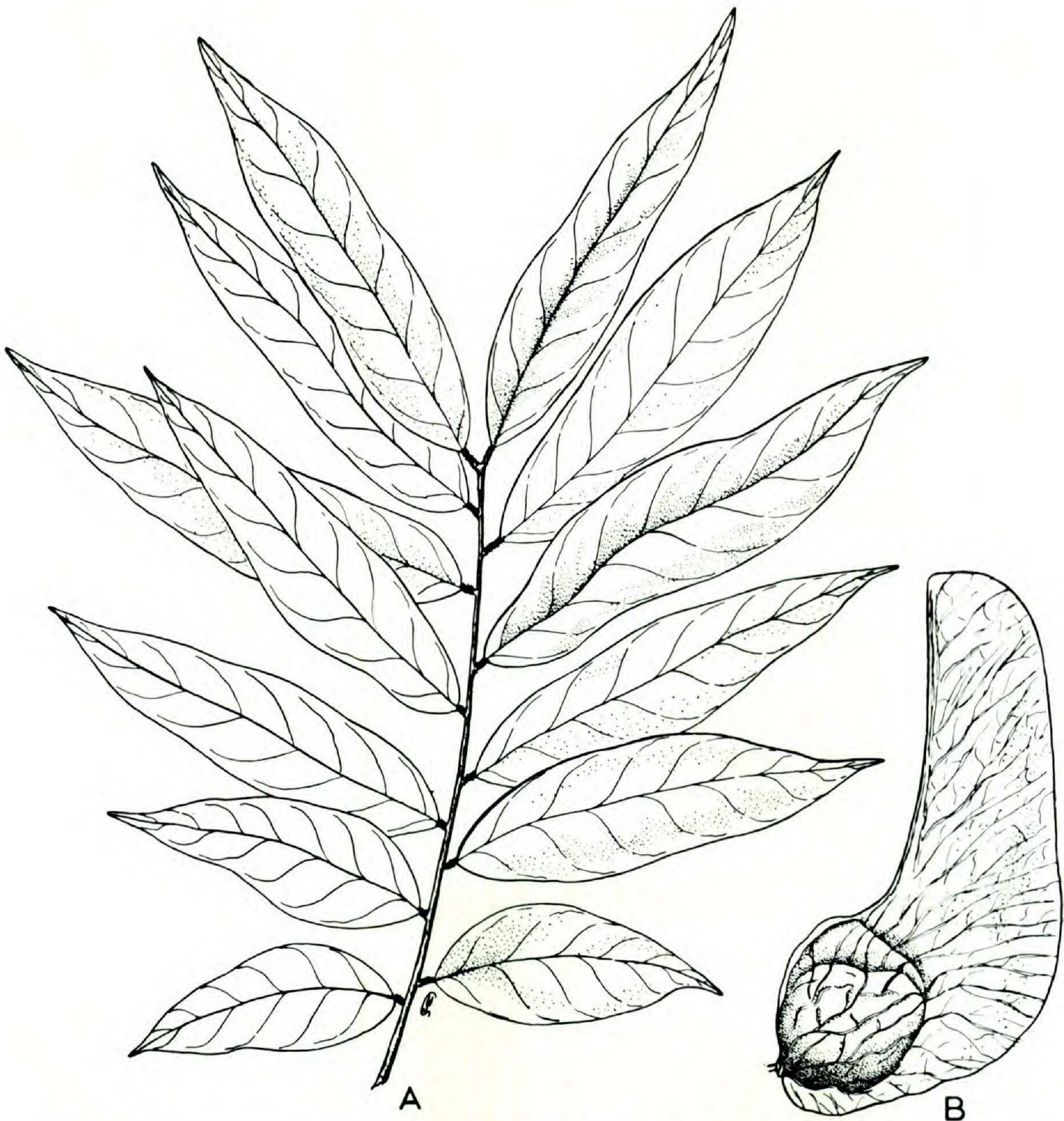


Figure 136. *PARAMACHAERIUM GRUBERI* Brizicky: A, leaf ( $\times \frac{1}{2}$ ); B, fruit ( $\times \frac{1}{2}$ ). After Gruber s. n. (MO, isotype).

teoles often much larger than the bracts. *Flowers* with the hypanthium campanulate, somewhat gibbous and bilabiate, obtuse at the base; vexillum distinctly clawed; carinal petals coherent; stamens 10, monadelphous, the anthers versatile; glandular disk present; ovary scarcely stipitate, the stigma capitate, the ovules several. *Fruits* sessile, the seminiferous area basal, turgid, the seeds several.

A genus of three species, one found in Panama, one in British Guiana and in the territory of R o Branco, Brazil, and the third in the States of Par  and Amazonas, Brazil.

1. *PARAMACHAERIUM GRUBERI* Brizicky, *Trop. Woods* **112**: 58. 1960.—Fig. 136.

*Tree* up to 30 m., the sap red. *Leaves* up to 27 cm. long, the leaflets 9-13, alternate, oblong, the apical oblanceolate or obovate, the basal lanceolate or ovate, 5-13 cm. long, 2-4.5 cm. wide, acuminate, the main veins about 14. *Panicles*

terminal, the rachis slender, up to 5 cm. long, tomentose. *Flowers* with the hypanthium tubular-campanulate, about 7.5 mm. long, carnose, densely pilulose within, the 3 lower teeth deltoid, about 2 mm. long, acute, the upper 2 united along most of their length, a little longer than the lower; vexillum suborbicular, about 9 mm. long; wing petals suborbicular, up to 8 mm. long, tapering more sharply along the upper margin; carinal petals gibbous, obovate-falcate, about 5 mm. long; stamens monadelphous, the sheath open above, up to 3.5 mm. long, the linear-subulate filaments up to 2.5 mm. long, the carinal filament free almost to the base of the sheath, the anthers about 0.5 mm. long, versatile; ovary apparently sessile, terete or more compressed above the middle, ferruginous-villose, the hairs more dense above the middle on the carinal side, 4- to 5-ovulate, the style about 3.5 mm. long, thickly subulate, glabrous. *Fruits* sessile, glabrous, the seminiferous area often plump, obliquely subrotund, occupying about one third of the length of the fruit, thickened, woody, strongly veined, lustrous, the wing cultriform, about 7.5 cm. long, up to 4.5 cm. wide, rounded, very thin, flat, the upper margin scarcely curved, the lower curved; seeds 4-5, separated by obvious septa, flat, lanceolate-oblong, about 2 cm. long, about 0.5 cm. wide, oblique and beaked.

Known only from Panama.

CHIRIQUÍ: Puerto Armuelles, *Gruber s. n.* (type), *Stern & Chambers 132.*

Brizicky, in his lengthy discussion of this species, favors relating *Paramachaerium* to *Machaerium*, rather than to *Pterocarpus* L. If, however, the wing of *Paramachaerium* were cut away, leaving a stump at the seminiferous area, it would be difficult to distinguish the fruits of the two genera. Of interest is the fact that the carinal stamen of *Paramachaerium* is more free of the sheath than are its companions, a character known to mark some of the species of *Pterocarpus*.

##### 5. CENTROLOBIUM Mart. ex Benth.

CENTROLOBRIUM Mart. ex Benth., *Comment. Legum. Gen.* 31. 1837.

*Trees*, unarmed. *Leaves* alternate, imparipinnate, the leaflets several, opposite or subopposite, the glandular-lepidote blades with the costa immersed or subprominulous; stipules inequilaterally ovate. *Panicles* terminal, densely flowered; bracteoles located above the middle of the pedicel. *Flowers* with the hypanthium subturbinate to campanulate, the upper teeth united, obtuse, the lower teeth acute; vexillum broadly ovate or orbicular; stamens 10, monadelphous, the sheath open above, the anthers versatile; ovary stipitate, the stipe rarely surrounded by a disk, the ovules 2-3, the style slender, curved, the stigma capitate. *Fruits* large, samaroid, indehiscent, the seminiferous area proximal, bearing a stylar spine, venose, glandular-lepidote; seeds subreniform, separated by transverse or oblique partitions.

A small tropical genus limited to Panama and northern South America. One species is introduced into Africa.

- a. Leaflets 9-21, mostly ovate-oblong, up to 6 cm. wide; hypogynous disk absent; fruit with the stylar spine scarcely free from the body of the wing .....1. *C. YAVIZANUM*

aa. Leaflets 7-15, mostly ovate-elliptic, up to 14 cm. wide; hypogynous disk evident; fruit with the styler spine free from the body of the wing

.....2. *C. PARAENSE* var. *ORINOCENSE*

1. *CENTROLOBIUM YAVIZANUM* Pittier, Jour. Wash. Acad. Sci. 5: 469. 1915.—Fig. 137.

*Tree*, the branchlets terete, densely pubescent and obviously orange-lepidote.



Figure 137. *CENTROLOBIUM YAVIZANUM* Pittier: A, leaf ( $\times 1$ ), B, flower ( $\times 5$ ); C, petals ( $\times 4$ ), C<sup>1</sup> vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium (monadelphly) and receptacle ( $\times 7$ ); E, stamens ( $\times 25$ ), E<sup>1</sup>, versatile and dehiscent anther, E<sup>2</sup>, anther showing dehiscence; F, pistil and receptacle ( $\times 10$ ); G, fruit and persistent calyx ( $\times 1$ ); H, spine of fruit ( $\times 3$ ). A after Stern, Chambers, Dwyer & Ebinger 761 (MO); B-H after Stern, Chambers, Dwyer & Ebinger 761A (MO).

*Leaves* with 9-21 leaflets, these oblong or ovate-oblong, 5-13 cm. long, about 6 cm. wide, briefly acuminate, chartaceous to thin-chartaceous, moderately villosulose especially on costa and veins, densely orange-lepidote below, the costa immersed or subprominulous, tapering markedly toward the apex; petioles 6-10 cm. long, up to 0.4 cm. wide, densely puberulent; stipules orbicular, membranous, villose. *Panicles* terminal, up to 50 cm. long, the branches arcuate, densely puberulent, orange-lepidote; bracteoles flat, rotund, about 1 mm. long, carnose, puberulent. *Flowers* with the hypanthium gibbous, campanulate, about 8 mm. long, carnose, glabrous but ferruginous-villosulose at the tips of the teeth, the upper teeth united almost to the apex, about 4 mm. long, the carinal tooth suborbicular, about 4.5 mm. long, and 4 mm. wide; vexillum strongly reflexed, obovate-oblong, about 11 mm. long, broadly cuneate at the base, the claw carnose; wing and carinal petals subequal, obovate-oblong, about 15 mm. long, about 4 mm. wide, gibbous proximally along the upper margin, the auricles small, carnose, glabrous, the claw short; carinal petals falcately and narrowly oblong, about 11 mm. long, about 4 mm. wide, the lower margin tapering to the base, the upper margin gibbous at the base, the auricles about 1.5 mm. long, rounded; stamens monadelphous, the sheath about 4 mm. long, about 3 mm. wide near the base, about 1.7 mm. wide near the apex, glabrous, the filaments subulate, about 1.5 mm. long, the anthers about 1 mm. long. *Fruits* stipitate for about 2.5 cm., the stipe with a few subulate spines up to 0.3 cm. long, the seminiferous area turgid, subrotund, about 4 cm. long, the spines 1.2-1.8 mm. long, about 0.5 mm. wide, the wing cultriform, up to 10 cm. long, scarcely wider at the apex than at the base, the upper proximal portion elevated above the seminiferous area for about 1.2 cm., the styler spine oblique, up to 1.2 cm. long, carrying the wing almost to its apex, the wing thin, glandular-lepidote, densely puberulent, the upper margin straight, the lower margin arcuate, the veins delicate, broadly arcuate; seeds usually solitary, oblong, about 0.6 cm. long, contorted, hard, smooth, lustrous, drying yellow.

Known only from the Province of Darien, Panama.

DARIEN: Yaviza, Pittier 6572; El Real, Stern, Chambers, Dwyer & Ebinger 731, 761, 761A.

The collections of Stern, Chambers, Dwyer & Ebinger cited above, were made from a solitary tree in a pasture adjacent to the airport at El Real. Laden with flowers (as well as with green fruits in all stages of development), it provided material for the first adequate description of the blossoms. Especially noteworthy is the absence of a hypogynous disk in the flowers.

In botanizing on the banks of the river at the type locality of Yaviza, a few miles from El Real, we found abundant fruits of *C. yavizanum*. It is known as *amarillo de Guayaquil* and is sought by lumbermen.

2. *CENTROLOBIUM PARAENSE* Tul. var. *ORENOCENSE* Benth. in Mart., Fl. Bras. **15**: (1): 266. 1862.

*Centrolobium patinense* Pittier, Jour. Wash. Acad. Sci. **5**: 470. 1915.

*Centrolobium orinocense* (Benth.) Pittier, Bol. Técn. (Min. Agric. Cria) Serv. Bot. (Caracas) **5**: 123. 1944.

*Tree*, tall. *Leaves* with 7-15 leaflets, these ovate to elliptic, 11-24 cm. long, 6-16 cm. wide, obtuse and often abruptly and shortly acuminate, rounded to subcordate at the base, glabrescent to glabrous, the margin lightly revolute, the blade orange-lepidote. *Inflorescences* unknown. *Flowers* not seen; hypogynous disk present. *Fruits* with the seminiferous area turgid, subglobose, up to 5 cm. long, the spines dense, linear-subulate, up to 3 cm. long, moderately stiff, the wing cultriform, up to 20 cm. long, up to 8 cm. wide, obliquely truncate to obliquely rounded at the apex, the upper margin slightly curved, the styler spine almost entirely free from the wing, up to 1 cm. long, the veins numerous, prominulous, curving sharply toward the lower margin.

Known from Panama, British Guiana, Brazil, and Ecuador.

DARIEN: Patino, *Pittier 6611* (type of *C. patinense*).

#### 6. PTEROCARPUS L.

PTEROCARPUS Jacq., *Sel. Stirp. Am. Hist.* 283. 1763.

*Moutouchi* Aubl., *Hist. Pl. Gui. Fr.* 748. 1775.

*Pterocarpus* L. sect. *Moutouchia* (Aubl.) DC., *Prodr.* 2: 418. 1825.

*Pterocarpus* sect. *Echinodiscus* DC., loc. cit. 418. 1825.

*Echinodiscus* (DC.) Benth., *Comment. Legum. Gen.* 30. 1837.

*Moutouchia* Aubl. corr. Benth., loc. cit. 30. 1837.

*Phellocarpus* Mart. ex Benth., loc. cit. 42. 1837.

*Ancylocalyx* Tul., *Ann. Sci. Nat., Bot., ser. 2*, 20: 136. 1843.

*Trees*, unarmed. *Leaves* alternate, imparipinnate; stipules usually minute. *Flowers* in axillary or terminal racemes or panicles; bracts and bracteoles small and caducous, or large and lanceolate; hypanthium campanulate, the teeth minute; stamens monadelphous or diadelphous, the sheath open above, occasionally below, the filaments short, the anthers versatile; ovary sessile or obviously stipitate, the style slender, the stigma terminal, minute. *Fruits* orbicular or oval-oblong, flat, the seminiferous area median, the wing membranous to coriaceous, disposed in an elliptic, falciform or circular fashion, rarely rudimentary, the seeds usually solitary.

A large pantropical genus of about 60 species, a third of which are in tropical Africa.

- a. Hypanthium aurous-puberulent; ovary appressed-pilose.
  - b. Leaflets 5-9; teeth of the calyx 1-2 mm. long; claw of the vexillum about 4.5 mm. long; ovary uniformly oblong .....1. *P. HAYESII*
  - bb. Leaflets 8-14; teeth of the calyx up to 0.5 mm. long; claw of the vexillum scarcely evident; ovary rotund at the base, narrowly oblong above .....2. *P. BELIZENSIS*
- aa. Hypanthium essentially glabrous; ovary glabrous .....3. *P. OFFICINALIS*

1. PTEROCARPUS HAYESII Hemsl., *Diag. Pl. Nov. Mex. Centr.-Am.* 8. 1878.

*Pterocarpus reticulatus* Standley, *Trop. Woods* 16: 38. 1928.

*Tree* up to 80 feet high. *Leaves* with 5-9 leaflets, these ovate or oblong, 6-13 cm. long, 3-6 cm. wide, the acumen vague or up to 1.5 cm. long, the margin crisp,

the blade thin-coriaceous, glabrous or pubescent, the costa prominulous above, the main veins 6-10; petioles 3-9 cm. long; rachises 4-19 cm. long, aurous-tomentulose. *Inflorescences* exceeding the uppermost leaves; pedicels 0.5-1.0 cm. long, slender. *Flowers* with the hypanthium obliquely urceolate or turbinate, 5-11 mm. long, aurous-puberulent, the teeth subequal, 1-2 mm. long, often the upper truncate, the 3 lower deltoid; vexillum oblong-rotund, 13-16 mm. long, glabrous; wing petals falcately oblong, up to 11 mm. long, the auricle subrotund, the claw about 5 mm. long; carinal petals subtrapeziform, up to 12.5 mm. long, about 3 mm. wide, puberulent along the upper margin, the claw about 2.5 mm. long; stamens monadelphous, the sheath about 4.5 mm. long, glabrous, the filaments variable, up to 7.5 mm. long, those with aborted anthers slender, those with functional anthers carnose and appressed-pilose; style slender, up to 10 mm. long. *Fruits* scarcely stipitate, oval, up to 6 cm. long, up to 5.5 cm. wide, membranous, winged, drying golden-tan, the numerous delicate veins arising flabellately from the base.

British Honduras, Nicaragua, Guatemala, Costa Rica, and Panama.

BOCAS DEL TORO: Almirante, Cooper 573; Western River, Chiriquí Lagoon, von Wedel 775. CANAL ZONE: Barro Colorado Island, Bangham 502, Chickering 57, Carpenter 45, 59, 63, Kenoyer 394, Salvoza 928, Shattuck 698, Standley 40869. DARIEN: Patino, Pittier 6612. PANAMA: Arraiján, Allen 2146; Mamoni River, Pittier 7000.

*P. hayesii* is beautifully figured in Hemsley, Biol. Centr.-Am. **5**: pl. 17. 1888. Its densely puberulent calyx readily distinguishes it from the more common *P. officinalis* Jacq. The type collection, Hayes 597, which I have not seen, was reported as being collected near Matachin, Province of Panama. The common name is *bloodwood*, the sap being intensely red.

2. *PTEROCARPUS BELIZENSIS* Standley, Trop. Woods **7**: 6. 1926.

*Tree*, small, the buttresses narrow and fluted, the trunk somewhat angular. *Leaves* with 8-14 leaflets, these oblong, up to 20 cm. long, up to 7 cm. wide, the acumen up to 1.5 cm. long, thinly coriaceous, glabrous, the main veins prominulous, branching near the margin, the margin scarcely thickened, irregular, occasionally with small glands (teeth); petiolules subturgid, about 0.8 cm. long; rachises terete; petioles swollen basally for about 1 cm., up to 15 cm. long. *Panicles* apparently terminal, up to 25 cm. long, the branches well-spaced, 4-5 cm. long, recurved, puberulent, 10 to 20 flowered; pedicels slender, about 0.4 cm. long, the pedicellar scars alternate. *Flowers* about 15 mm. long, the hypanthium urceolate, about 5 mm. long, minutely puberulent, the teeth subequal, deltoid, up to 0.5 mm. long; vexillum orbicular, about 13.5 mm. long, emarginate, glabrous, the basal auricle obtuse, about 0.3 mm. long, the claw up to 1.5 mm. long; wing petals narrowly oblong, up to 11.5 mm. long, the auricles obtuse, glabrous; carinal petals free, oblong-oval, longer than the wing petals, about 13 mm. long, obliquely truncate at the base, the upper auricle somewhat larger than the lower, the claw about 4 mm. long, minutely puberulent; stamens monadelphous, the sheath flat, about 5 mm. long, the filaments variable in length, the lateral ones almost as long as the sheath, glabrous, the anthers about 1 mm. long; ovary short-stipitate, flat, subrotund at the base, narrowly oblong

above, about 5 mm. long, about 1.3 mm. wide at the base, villosulose, the style subulate, about 2 mm. long. *Fruits* suborbicular, up to 8 cm. long, drying tan, the seminiferous area turgid at maturity, the wing paper-thin, glabrous.

Known from British Honduras and Panama.

BOCAS DEL TORO: Almirante, *Cooper* 496. CANAL ZONE: Las Cascadas, *Sianca* 310.

*P. belizensis* appears to be more closely related to *P. hayesii* than to *P. officinalis*. Two floral characters immediately segregate it from both of these: the shortly clawed vexillum and the basally rotund ovary. The floral description given above is based on *Sianca's* collection (310) in the U. S. National Herbarium. The common names of the species are *cricamola* and *kaway*. The type is *Record 12* from British Honduras.

3. *PTEROCARPUS OFFICINALIS* Jacq., *Sel. Stirp. Am. Hist.* 283. t. 183, fig. 92. 1763.  
—Fig. 138.

*Pterocarpus draco* L., *Sp. Pl.* ed. 2, 1662. 1763, pro parte.  
*Moutouci suberosa* Aubl., *Hist. Pl. Gui. Fr.* 748. t. 299. 1775.  
*Pterocarpus suberosa* (Aubl.) Pers., *Syn. Pl.* 2: 277. 1807.

*Trees*, medium-sized to large. *Leaves* with 8-12 leaflets, these alternate, ovate-oblong to oblong, 7.5-15 cm. long, 3.5-7 cm. wide, the acumen falcate, up to 2 cm. long, vaguely decurrent on the petiolule, chartaceous to thinly coriaceous, lustrous, reticulate, glabrous, the costa plane or immersed above, the main veins 10-20, arcuate, the margin somewhat crisp; petioles 2.5-7 cm. long, swollen basally; rachises up to 17 cm. long. *Panicles* terminal, often equal to the leaves in length, the rachises up to 0.3 cm. wide at the base, drying black, scattered ferruginous-villose, the lowermost branches spreading, up to 7 cm. long, the flowers mostly persistent at the tips of the branches; bracts lanceolate, about 2 mm. long, the bracteoles up to 0.6 mm. long; pedicels slender, about 3 mm. long. *Flowers* with the hypanthium turbinate, about 1.3 mm. long, thickly carnose, glabrous; vexillum reflexed, suborbicular to obreniform-orbicular, about 8 mm. long, glabrous, the claw cuneate, up to 5 mm. long; wing petals obliquely rotund, up to 11.5 mm. long, up to 6 mm. wide, truncate at the base, glabrous, the claw about 4 mm. long; staminal sheath 2.5-4 mm. long, about 0.7 mm. wide, glabrous, the filaments often slightly longer than the sheath, the anthers about 0.5 mm. long; ovary stipitate for 3.5 mm., about 3 mm. long, glabrous, the subulate style up to 2.5 mm. long. *Fruits* stipitate for about 3 mm., flat, the winged body inequilateral, subrotund, oblong or ovate, 2-5 cm. long, 3-3.5 cm. wide, obtuse to acuminate at the apex, very oblique at the base, smooth, lustrous, the veins usually prominent and flabellate.

*P. officinalis* is widely distributed in Central America, in the Antilles, and in many parts of northern South America.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater* 128; Punta Rovalo to Rovalo River, Chiriquí Lagoon, *Seibert* 1650; Finca 11, west of Almirante, *Stern & Chambers* 109; Water Valley, *von Wedel* 593, 843; Western River, Chiriquí Lagoon, *von Wedel* 2705, 2775, 2777; locality unknown, *Kluge* 65, *Stern* 168. CANAL ZONE: Fort Sherman, *Allen* 118, *Standley*



Figure 138. *PTEROCARPUS OFFICINALIS* Jacq.: A, flowering and fruiting branch ( $\times 1$ ); B, flower ( $\times 5$ ); C, petals ( $\times 4$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium and receptacle ( $\times 15$ ); E, pistil ( $\times 5$ ). A after *Stern & Chambers 168* (MO); B-E after *Allen 17154* (MO).

31173; Chiva-Chiva Trail to Searchlight Station, *Hunter & Allen 950*; Barro Colorado Island, *Bangham 502*; south of Salamanca Hydrographic Station, *Steyermark & Allen 17154*. DARIEN: El Real, *Duke 4931*; Punta Guaya Chiquita, *Stern & Chambers 168*; Campamento Buena Vista, Río Chucunaque above Río Tuquesa, *Stern, Chambers, Dwyer & Ebinger 859*. PANAMA: Arraiján, *Allen 2146*; San José Island, *Johnston 789, 790*; Gatuncillo River, *Rowlee & Rowlee 422*.

*P. officinalis* is a lowland species; the bark is rough and the wood soft and



elaborating a red sap. The wood is useful in various kinds of construction and has the unusual property of being combustible in the fresh state. The flowers are yellow-orange with a red stripe on the vexillum. There are a number of common names: *bloodwood*, *swamp kaway*, *sangre*, *sangre de drago*, *huevo de gato*, *cricamola*, and *chuella*. I. M. Johnston (*Sargentia* **8**: 160. 1949) states that the fruits are apparently ripe in November and December and are washed up on the beaches (Bodega Bay, San José Island).

#### 7. PLATYMISCIUM Vogel

PLATYMISCIUM Vogel, *Linnaea* **11**: 198. 1837.

*Trees* or shrubs. *Leaves* opposite to whorled, the leaflets several, pinnate, opposite, subcoriaceous, pinnately nerved, reticulate; stipules caducous. *Racemes* (or panicles) solitary to several in the axils of the new leaves or arising at exfoliate nodes; bracts and bracteoles minute; pedicels obvious. *Flowers* with the hypanthium campanulate, the teeth 5, short; vexillum orbicular or ovate; wing petals oblong, about equal to the carinal petals in length, unequal at the base; carinal petals oblong, coherent distally; stamens monadelphous, the sheath open or closed above, or occasionally diadelphous, the anthers versatile; ovary stipitate, oblong. *Fruits* indehiscent, flat, membranous, vaguely reticulate, the seeds flat, reniform, large, the rostellum inflexed.

A genus of about 20 species confined to tropical America; only one species is reported from Panama.

#### 1. PLATYMISCIUM POLYSTACHYUM Benth. ex Seem., *Bot. Voy. Herald* 111, t. 21. 1853.—Fig. 139.

*Amerimnon pinnatum* Jacq., *Sel. Stirp. Am. Hist.* 200, t. 47, fig. 50. 1763.

*Platymiscium dubium* Pittier, *Contr. U. S. Nat. Herb.* **20**: 125. 1918.

*Platymiscium pinnatum* (Jacq.) Dugand, *Contr. Hist. Nat. Colomb.* **1**: 11. 1938.

*Tree*. *Leaves* opposite; leaflets 4-7, opposite, ovate, ovate-rotund, oblong, or elliptic, 5.5-21 cm. long, 4-8 cm. wide, acuminate, often falcately so, or obtuse, occasionally cuneate at the base, occasionally decurrent for 1-3 mm. along the petiolule, chartaceous to thinly coriaceous, the main veins about 10; petioles 0.1-0.6 cm. long, swollen at the base; stipules interpetiolar, triangular-subulate, up to 1.2 cm. long, acute, glabrous, deciduous, the scar distinct. *Inflorescences* either flabellate-paniculate on short, gnarled branches, the rhachis up to 12 cm. long, or in axillary racemes shorter than the leaves; flowers numerous, patulous, often paired in the panicles; pedicels 3-5 mm. long, glabrous; bracteoles ovate. *Flowers* with the hypanthium campanulate, about 4 mm. long, densely puberulent, the teeth unequal, the uppermost pair united along most of their length, the free parts about 0.3 mm. long, subuncinate, the 3 lower teeth 0.7-1.0 mm. long; vexillum orbicular, 6-11.5 mm. long, obtuse at the base, pilulose within; wing petals narrowly oblong, about 10 mm. long; carinal petals subreniform, 8-9.5 mm. long; staminal sheath 5-8 mm. long, open above, 1-1.3 mm. wide, the filaments 2-3.3 mm. long, often farinose at the tips, the anthers 0.6-0.9 mm. long; ovary stipitate for about 5.5 mm., 2-3 mm.



Figure 139. *PLATYMISCIUM POLYSTACHYUM* Benth.: A, habit ( $\times 1$ ); B, flower ( $\times 5$ ); C, petals ( $\times 4$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium ( $\times 5$ ), D<sup>1</sup>, diadelphous and pistil in part, D<sup>2</sup>, monadelphous; E, anthers (much enlarged), E<sup>1</sup> and E<sup>2</sup>, stages of dehiscence; F, pistil ( $\times 7$ ); G, fruit ( $\times 1$ ). A after Allen 1633 (MO); B-G after Pittier 5724 (US).

long, glabrous or a with a few, very short hairs, the style 2-2.5 mm. long, glabrous. *Fruit* stipitate for about 1 cm., 5-10 cm. long, obtuse, reticulate, glabrous, apparently often glaucous, the seminiferous area oblong, up to 2 cm. long, the seeds solitary.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Trinidad, Colombia, and Venezuela.

CANAL ZONE: Barro Colorado Island, *Carpenter 51*; Hospital Grounds, Ancón, *Pittier 5724*. COCLÉ: Penonomé, *R. S. Williams 395*. DARIEN: Pinogana, *Pittier 6557*; Río Congo, *Pittier 6988*. PANAMA: Río Las Lajas, *Allen 1633*; Chorrera, *Allen 1699*.

The wood is hard and streaked with black and red and is used extensively in furniture and cabinets. According to Seemann the vernacular name is *quira* and the commercial names are *redwood* and *venicola*. The flowers are yellow or orange.

#### 8. PISCIDIA L.

PISCIDIA L., Syst. Nat. ed. 10, 1155. 1759, nom. gen. conserv.

*Ichthyomethia* P. Browne, Civ. Nat. Hist. Jamaica 296. 1756.

*Trees.* Leaves imparipinnate, apparently estipulate; leaflets opposite, several. *Panicles* axillary, short; bracteoles elliptic, caducous. *Flowers* with the hypanthium subcampanulate or urceolate, the teeth minute; standard orbicular, the wing petals adhering to the keel petals, the latter obtuse; stamens 10, monadelphous, the vexillar filament free at the base, soon united with the others in a closed sheath; ovary sessile, pluriovulate, the style reflexed, the stigma minute, capitate. *Fruits* slender, the seminiferous area terete, with 4 membranous wings, the seeds several, oblong, black.

A monotypic genus extending from tropical Florida to Venezuela; apparently introduced into Hawaii.

1. PISCIDIA PISCIPULA (L.) Sargent, Garden and Forest 4: 436. 1891.—Fig. 140.

*Erythrina piscipula* L., Sp. Pl. 707. 1753.

*Piscidia erythrina* L., Syst. Nat. ed. 10, 1155. 1759.

*Ichthymethia piscipula* Hitchcock in Sargent, loc. cit., 472. 1891.

*Tree*, large. Leaves with 6-10 leaflets, obovate-oblong, often inequilateral, up to 9.5 cm. long, up to 5.5 cm. wide, tapering obtusely but shortly acuminate and mucronate at the tip, thinly coriaceous, apparently glabrous above and below, the costa plane above, the main veins 8-11; petioles 1.5-2 cm. long, puberulent; petioles up to 0.6 cm. long, contorted, minutely puberulent; rachises 4-7 cm. long racemes axillary, up to 13 cm. long, often very nodose above, the branches often several at the base of the rachis, 2-15 cm. long; bracteoles reniform, up to 0.9 cm. long, densely puberulent on the outside. *Flowers* with the calyx campanulate, about 6 mm. long, puberulent, persistent, the teeth short, obtuse to acute, the uppermost usually united; vexillum orbicular, about 12 mm. long, puberulent on the outside; wing petals semiorbicular, about 13 mm. long, glabrous, irregularly undulate on the upper margin, the auricles rounded, about 1.1 mm. long; carinal petals subreniform, about 10.5 mm. long, pubescent; stamens monadelphous, the sheath glabrous, carinose, almost 3 times the length of the filaments, the odd filament free for about 2 mm. at the base; ovary scarcely stipitate, curved, linear, about 1 mm. wide, somewhat flat, densely puberulent, the style thickly subulate, puberulent along  $\frac{2}{3}$  of its length, attenuate at the tip. *Fruits* pedicellate, the pedicel about 1 cm. long, very slender and puberulent, the body stipitate for 1-1.5 cm. terete, the wings 4, longitudinal, each wing rectangular, 3-7 cm. long, about 4 cm. wide, truncate at the apex and at the base, thinly membranous, the veins crowded, pinnate, glabrous.

Florida, West Indies, Mexico, southward to Venezuela.

CANAL ZONE: Madden Dam, Allen 4315.

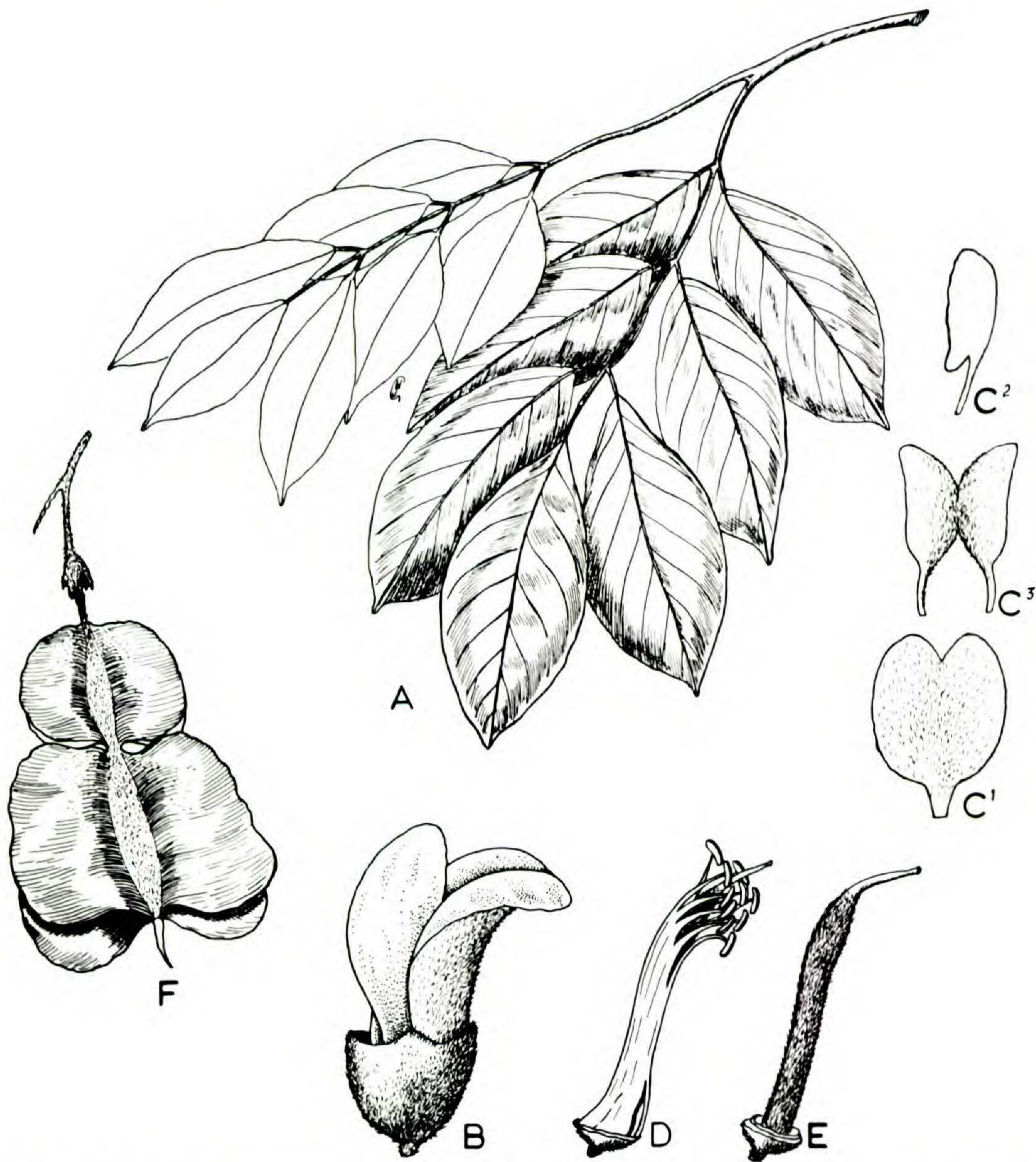


Figure 140. *PISCIDIA PISCIPULA* (L.) Sarg.: A, leaves ( $\times 1$ ); B, flower ( $\times 5$ ); C, petals ( $\times 3$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium (monadelphous) with part of pistil ( $\times 6$ ); E, pistil ( $\times 6$ ); F, fruit with persistent calyx ( $\times 1$ ). A after Gentle 1640 (MO); B-F after Allen 4315 (MO).

*P. piscipula* is known as the fish poison tree, the extract from the bark being used in stupefying fish. The crystalline salt from the alkaloid is known as piscidin and has remarkable sedative and soporific properties. J. F. Rock (in *The Leguminous Plants of Hawaii* 171. 1920) discusses the pharmacological properties of *P. piscipula*. The wood is very hard; the flowers are described as pale pink; the fruits with their four conspicuous wings are exceptionally striking.

#### 9. MUELLERA L. f.

MUELLERA L. f., *Suppl. Pl. Syst. Veg.* 53. 1781, nom, gen. conserv.

*Coublandia* Aubl., *Hist. Pl. Gui. Fr.* 937. 1775.

Trees or shrubs. Leaves with several leaflets pinnately disposed; bracts and bracteoles minute, deciduous. Flowers with the hypanthium campanulate to cyathi-

form, truncate, the 5 teeth short; vexillum suborbicular, lacking auricles or callosities; wing petals curved, oblong, adhering to the keel petals, the latter oblong; stamens monadelphous, the odd filament free at the base, the anthers versatile; ovary shortly stipitate, without a glandular disk, the style curved, glabrous, the stigma minute. *Fruits* somewhat terete, thick, leathery, indehiscent, sometimes globose or moniliform; seeds numerous, numerous, occasionally solitary, ovoid to subglobose, the hilum lateral, somewhat incurved.

A genus of about three species; apparently rare in Central America, occasional in the West Indies, and apparently well represented in northern South America; only one species is known from Panama.

1. MUELLERA MONILIFORMIS L. f., Suppl. Syst. Veg. 53. 1781.—Fig. 141.

*Coronilla monilis* L., Pl. Surin. 13. 1775.

*Coublandia frutescens* Aubl., Hist. Pl. Gui. Fr. 937. 1775.

*Lonchocarpus pterocarpus* DC., Prodr. 2: 260. 1825.

*Sphinctolobium glaucescens* Miq., Stirp. Surin. Sel. 19, t. 4. 1850.

*Derris moniliformis* (L. f.) Ducke, Bol. Téc. Inst. Agron. Norte (Belém) 2: 29. 1944.

Tree up to 35 m. high. *Leaves* with (3-)5-7 leaflets, these elliptic, 6-17 cm. long, 4-9 cm. wide, acute or with an acumen up to 2 cm. long, obtuse at the base, stiffly chartaceous, bicolor, gray beneath, often reticulate, glabrous above, minutely puberulent beneath, the costa plane or subimmersed above, the main veins 6-10, arcuate; petioles 5-6 cm. long; rachises 3-6 cm. long, stiff, glabrous, apparently angular; petioles about 0.5 cm. long, stiff and at right angles to the petioles, densely puberulent. *Panicles* with rachises up to 7.5 cm. long, puberulent, the flowers few, patulous; pedicels about 8 mm. long, glabrous. *Flowers* with the hypanthium galeate, bowl-shaped, 3-6 mm. long, thinly carnose, minutely puberulent, the teeth absent or minute, deltoid to mammiform, 0.5-2.5 mm. long; vexillum reflexed, oblong-rotund, 12-30 mm. long, 9-13 mm. wide, occasionally aurous-puberulent at the apex, the auricles not evident, the claw thickened, 2-10 mm. long, glabrous; wing petals narrowly ovate-oblong, 12-18 mm. long, often puberulent at the tip, the claw about 4 mm. long; carinal petals oblong-subreniform, 11-15 mm. long, the margin at the apex thickened, velutinous, the claw 3-5 mm. long; staminal sheath flat, about 6 mm. long, geniculate at the base, the filaments thickened, the anthers about 0.8 mm. long, apiculate, often with a few hairs, the odd filament free at the base, then briefly united to the sheath, the latter closed at the base; ovary sessile, flat, subsigmoid, 5-7 mm. long, villose, the style thickly subulate, 4-7 mm. long, about 0.6 mm. wide, glabrous. *Fruits* pedicellate for about 0.3 cm., rotund or nuciform, occasionally oblong, 2.5-5 cm. long, often constricted 1 to 3 times, the pericarp corky, the seeds 1-4, flat, suborbicular, about 1.5 cm. long.

Panama, Trinidad, and continental northern South America.

BOCAS DEL TORO: Chiriquí Lagoon, Fish Creek Hills, *von Wedel* 2452. CANAL ZONE: Experimental Garden, Old Plot #4, *Higgins* 498. DARIEN: Río Congo, *Pittier* 6893; Puerto St. Dorotea, *Dwyer* 2291.

The species is readily recognized by the stiff rachises and petiolules, the fili-

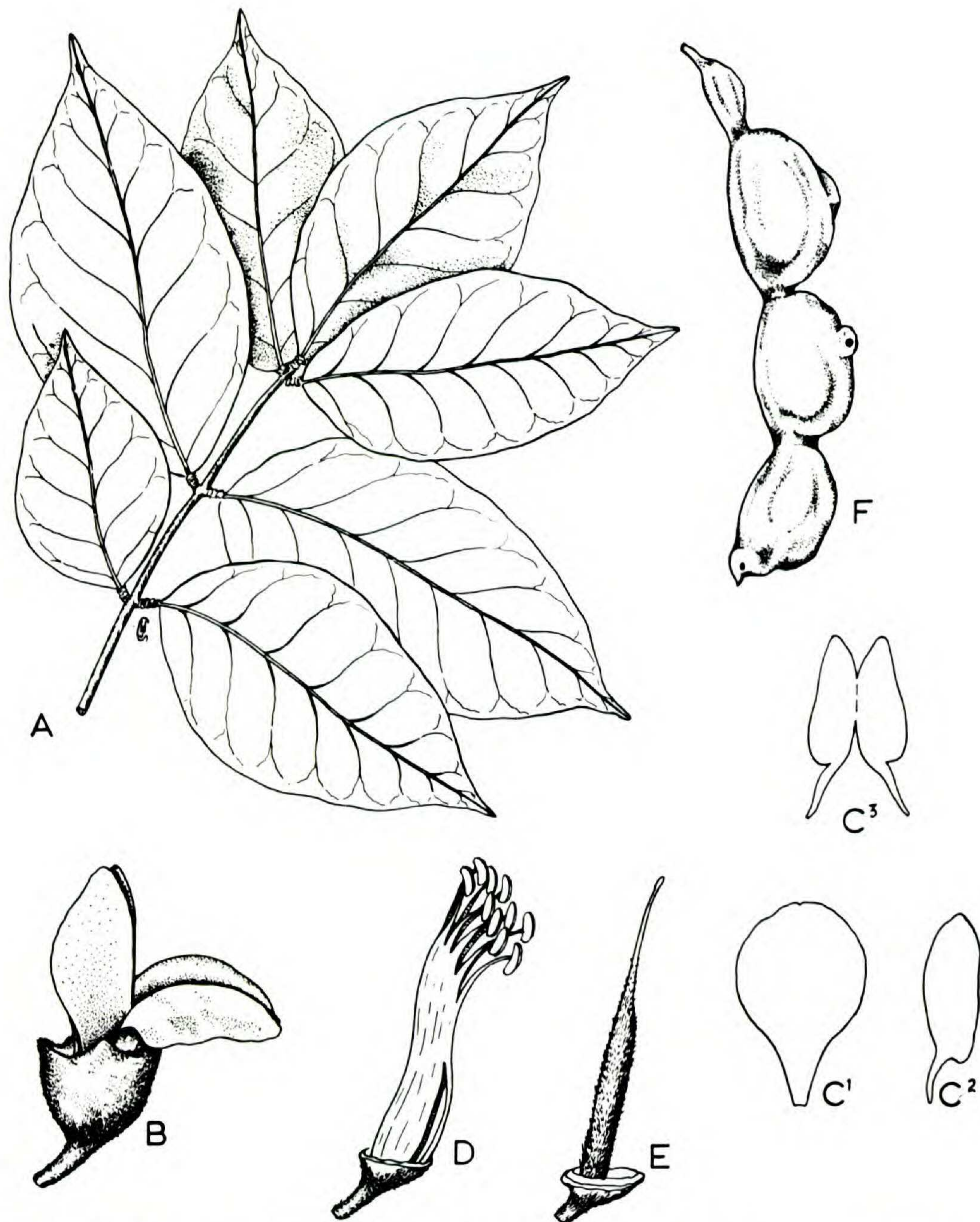


Figure 141. *MUELLERA MONILIFORMIS* L. f.: A, leaf ( $\times 1$ ); B, flower ( $\times 4$ ); C, petals ( $\times 3$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium (monadelphy) ( $\times 6$ ); E, pistil ( $\times 8$ ); F, fruit ( $\times 2$ ). A-E after *von Wedel* 2442 (MO); F after *Dwyer* 2291 (MO).

form pedicels of the flowers and the fruits which are usually moniliform. The flowers are purple. Macbride's remark (*Field Mus. Nat. Hist., Bot. Ser.* **13**(3): 258. 1943) that in *Muellera* ". . . one species . . . is one-seeded . . . and in the other more common one . . . is . . . usually several to many seeded . . ." is confusing since the well-known *M. moniliformis* (to which Macbride is obviously referring in the latter part of his statement) is known to vary greatly in the morphology of the fruits and in the number of seeds contained. Amshoff (in *Pulle, Fl. Suriname* **2**(2): 148. 1939) states that the leaflets are pellucid-punctate. I have not been able to verify this in dried material.

## 10. LONCHOCARPUS H. B. K.

BY F. J. HERMANN

LONCHOCARPUS H. B. K., Nov. Gen. Sp. Pl. 6: 383. 1824, nom. gen. conserv.

*Clompanus* Aubl., Hist. Pl. Gui. Fr. 773. 1775.

*Trees* or shrubs. *Leaves* alternate, odd-pinnate (rarely 1-foliolate); leaflets opposite, mostly estipellate. *Flowers* purple, pink or whitish, borne in paniculate racemes; pedicels geminate or fasciculate on generally rudimentary secondary peduncles, rarely solitary or racemose; bracts and bractlets generally small, caducous or persistent; calyx mostly cupulate, truncate or minutely toothed; vexillum usually orbicular, generally auriculate at the base, emarginate at the apex; wing petals oblique-oblong or falcate, adhering to the carinal petals above the claw; carinal petals obtuse, more or less arcuate, connate along their lower margin; stamens monadelphous, the tube fenestrate at the base; vexillar stamen free at the base; anthers versatile; ovary sessile or stipitate, 2- to 10-ovulate; style filiform, arcuate; stigma capitellate. *Legumes* indehiscent, oblong or suborbicular to elongate, flat, membranous or coriaceous, the vexillar suture thin, concave, thickened or carinate; seeds 1-4, compressed, more or less reniform.

About 175 species in Central and South America, West Indies, Africa and Australia; 13 species and two varieties are presently reported from Panama. The South American *L. nicou* (Aubl.) DC. is now the principal source of *rotenone*.

- a. Flowers in pairs on short, secondary peduncles racemosely arranged along the floral axis.
  - b. Vexillar margin of the legume sharp-edged or rounded.
    - c. Midrib and secondary veins impressed on the upper surface of the leaflets, very prominent beneath; legume pubescent.
      - d. Legume coriaceous, elliptic, 2.5 cm. wide, appressed-sericeous; flowers pinkish-purple, the wing petals subfalcate, 13.5 mm. long, 3.5 mm. wide; leaflets 7-13 .....1. *L. FENDLERI*
      - dd. Legume submembranous, elongate to linear-lanceolate, 1.5-1.7 cm. wide, velutinous; flowers deep-purple, the wing petals narrowly oblong, 8 mm. long, 2 mm. wide; leaflets 7 (rarely 5 or 9) .....2. *L. VELUTINUS*
      - cc. Midrib and secondary veins not conspicuously impressed on the upper surface of the leaflets; legume glabrous.
        - d. Leaflets pellucid-punctate.
          - e. Leaflets 2.5-4.5 cm. wide, abruptly acuminate to caudate at the apex; legume oblique-ovate to ovate-lanceolate, 4.5-6.5 cm. long (when rarely 3-seeded up to 13 cm. long), coriaceous, substipitate .....3. *L. PENINSULARIS*
          - ee. Leaflets 4.5-6 cm. wide, subacuminate to an obtuse apex; legume broadly oblong, 10 cm. long, subligneous, long-stipitate .....4. *L. CHIRICANUS*
      - dd. Leaflets epunctate.
        - e. Legume orbicular to oblong, rounded or abruptly acute at base and apex; vexillum 10-12 mm. long; racemes generally compound or apparently fastigate and terminal .....5. *L. LUTEOMACULATUS*
        - ee. Legume elliptic, cuneate-attenuate at base and apex; vexillum 5-7 mm. long; racemes generally simple, axillary .....6. *P. PENTAPHYLLUS*
    - bb. Vexillar margin of the legume thickened at the seeds, carinate or concave.
      - c. Leaves 1-foliolate .....7. *L. MONOFOLIARIS*

- cc. Leaves multifoliolate.
- d. Vexillum about 9 mm. long, the margins strongly inflexed.
- e. Leaflets 2-6.5 cm. long, 1-3 cm. wide; petiolules 2-3 mm. long; secondary peduncles predominantly biflorous, 2-3 mm. long; vexillum sparsely sericeous toward the apex outside, its claw 0.8 mm. long .....8. *L. ATROPURPUREUS*
- ee. Leaflets 6-15 cm. long, 2.5-7 cm. wide; petiolules 4.5-6 mm. long; secondary peduncles uniflorous, 0.5 mm. long; densely sericeous outside, its claw 1.5 mm. long .....9. *L. OLIGANTHUS*
- dd. Vexillum 12-16 mm. long, the margins not inflexed.
- e. Leaflets pellucid-punctate; petiolules glabrous.
- f. Flowers 10-13 mm. long; calyx in anthesis generally 6 mm. wide or less, usually densely sericeous; rachis of inflorescence densely canescent; secondary peduncles usually 0.5-1 mm. long .....10. *L. GUATEMALENSIS*
- ff. Flowers 13-16 mm. long; calyx in anthesis generally 7 mm. wide or more, usually sparsely sericeous; rachis of inflorescence glabrous; secondary peduncles usually 2-2.5 mm. long .....10a. —var. *PROTERANTHUS*
- ee. Leaflets epunctate; petiolules pubescent.
- f. Leaflets scabridulous-puberulent above, tomentulose to densely puberulent beneath .....11. *L. SERICEUS*
- ff. Leaflets glabrous above, glabrate or minutely puberulent (principally on the veins) beneath .....11a. —var. *GLABRESCENS*
- aa. Flowers not paired, in short racemes (or by abortion subfasciculate) arranged along the floral axis.
- b. Secondary inflorescences racemose; leaflets estipellate .....12. *L. CALCARATUS*
- bb. Secondary inflorescences subfasciculate; leaflets stipellate .....13. *L. DENSIFLORUS*

1. *LONCHOCARPUS FENDLERI* Benth., Jour. Linn. Soc., Bot. 4 (Suppl.): 94. 1860.

*Lonchocarpus stenurus* Pittier, Bol. Minist. Relac. Exter. Venez. 8-9: 102. 1927.

*Tree* 4-12 m. high. *Leaves* 7- to 13-foliolate, appearing with the flowers; leaflets ovate-oblong or slightly obovate, 3-9 cm. long, 2-4 cm. wide, rounded or tapering at the base, obtuse or subacute at the apex, at length coriaceous, glabrous and often lustrous above, more or less rufous-tomentose beneath. *Racemes* axillary, 10-14 cm. long. *Flowers* with the calyx turbinate-campanulate 5 mm. long, cinereous-strigose, the teeth obsolete; petals pinkish-purple; vexillum orbicular, 11-12 mm. long, attenuate at the base, sparsely pubescent within; wing petals oblong, subfalcate, auriculate, the claw 5 mm. long, the blade about 9 mm. long, glabrous or sparsely pilulose without; staminal tube narrowly fenestrated; anthers sparsely setulose at the base. *Legumes* subsessile or short-stipitate, flattened, elliptic, about 8 cm. long, 2.5 cm. wide, coriaceous, 1 (rarely 2-4)-seeded, appressed-sericeous.

Panama and Venezuela; not previously reported from Central America.

BOCAS DEL TORO: Island Potrero, Changuinola Valley, *Dunlap* 347.

2. *LONCHOCARPUS VELUTINUS* Benth. ex Seem., Bot. Voy. Herald 111. 1853.

*Tree* 5-16 m. high. *Leaves* predominantly 7 (rarely 5- or 9-) foliolate; leaflets oval or oblong, 4-15 cm. long, 2-5 cm. wide, acute at the base, short-acuminate to obtuse or retuse at the apex, velutinous. *Racemes* axillary, 11-20 cm. long; bractlets



linear, caducous, distant from the calyx. *Flowers* with the calyx salverform, 5-dentate; petals dark purplish-red; vexillum orbicular, 9 mm. long, minutely sericeous within; wing petals narrowly oblong, the claw about 2.5 mm. wide, the blade 5.5 mm. long; anthers sparsely and minutely hairy. *Legumes* thin and flattish, elongate- to linear-lanceolate, 8-11 cm. long, 1.5-1.7 cm. wide, submembranous, stramineous or pale yellow, 1- or 2-seeded.

Central America and Colombia.

CANAL ZONE: Barro Colorado Island, *Shattuck s.n., Woodworth & Vestal 712*; near Miraflores, *P. White 80*. CHIRIQUÍ: around Caldera, alt. 200-300 m. *Pittier 3353*. COCLÉ: Penonomé, *R. S. Williams 349*. VERAGUAS: vicinity of Santa Fé, 1000 ft. alt., *Allen 4439*.

The two collections cited by Seemann in his original description came from Panama; San Carlos, Prov. of Panama, *Seemann 1138*, and Culebra, Canal Zone, *Hinds s. n.*

3. LONCHOCARPUS PENINSULARIS (J. D. Sm.) Pittier, *Contr. U. S. Nat. Herb.* **20**: 56, *pl. 2, A, fig. 4.* 1917.

*Derris peninsularis* J. D. Sm., *Bot. Gaz.* **44**: 111. 1907.

*Derris nicoyensis* J. D. Sm., loc. cit. 111. 1907.

*Lonchocarpus nicoyensis* (J. D. Sm.) Pittier, loc. cit. 57, *pl. 2, B, fig. 5.* 1917.

*Lonchocarpus cochleatus* Pittier, loc. cit. 68, *pl. 4, C.* 1917.

*Lonchocarpus purpusii* Brandegee, *Univ. Calif. Publ. Bot.* **6**: 500. 1919.

*Lonchocarpus kerberi* Harms, *Repert. Sp. Nov.* **17**: 322. 1921.

*Lonchocarpus chiapensis* Lundell, *Wrightia* **1**: 152. 1946.

*Lonchocarpus nicaraguensis* Lundell, loc. cit. 154. 1946.

*Shrub* or small tree. *Leaves* 5- to 9-foliolate; leaflets ovate, elliptic or obovate, 4-10 cm. long, 2.5-4.5 cm. wide, acute at the base, abruptly acuminate to caudate at the apex, pellucid-punctate, glabrous above, minutely grayish-strigose beneath. *Racemes* axillary, 6-8 cm. long. *Flowers* with the calyx cupulate, 3-5 mm. long, glabrous or minutely puberulent; petals pink to dark red; vexillum suborbicular, 10 mm. long, more or less cinereous to sericeous outside especially along the veins, the margins inflexed except toward the base; wing petals oblong to somewhat falcate, the claw 2.5 mm. long, the blade 7 mm. long, glabrous. *Legumes* flattened, obliquely ovate to ovate-lanceolate, 4.5-6.5 cm. long (when, rarely, 3-seeded up to 13 cm. long), coriaceous, glabrous, chiefly 1-seeded.

Mexico (Jalisco, Guerrero and Veracruz) to Panama.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *von Wedel 1180*.

4. LONCHOCARPUS CHIRICANUS Pittier, *Contr. U. S. Nat. Herb.* **20**: 63, *pl. 3, A.* 1917.

*Tree*, small. *Leaves* 7- to 9-foliolate; leaflets ovate to obovate, 6-11 cm. long, 4.5-6 cm. wide, rounded at the base, abruptly acuminate to a short, blunt apex, membranous, dark green and glabrous above, paler and minutely pilosulous beneath, pellucid-punctate. *Flowers* unknown. *Legumes* long-stipitate, flattened, broadly oblong, 10 cm. long, 4 cm. wide, subligneous, glabrous, 1-seeded.

Panama; known only from the type collection.

CHIRIQUÍ: Parida Island, *Pittier 2817* (type).

5. *LONCHOCARPUS LUTEOMACULATUS* Pittier, Contr. U. S. Nat. Herb. **20**: 64, *pl.* 4, *B*, *fig.* 12. 1917.

*Lonchocarpus izabalanus* Blake, Contr. U. S. Nat. Herb. **24**: 7. 1922.

*Lonchocarpus monospermus* Standley, Field Mus. Nat. Hist., Bot. Ser. **4**: 311. 1929.

*Lonchocarpus belizensis* Lundell, *Wrightia* **1**: 55. 1945.

*Tree* 4.5-9 m. high. *Leaves* 5- to 9-foliolate; leaflets elliptic-ovate or obovate to oblanceolate-oblong, 6-14 cm. long, 3-7 cm. wide, rounded to cuneate at the base, subacuminate to rounded at the apex, membranous to subcoriaceous, finely strigillose, dark green above, glaucescent beneath. *Racemes* mostly compound, axillary or subfasciculate, sometimes appearing terminal, 9-15 cm. long. *Flowers* with the calyx cupulate, 3 mm. long, rusty-strigillose, the depressed-deltoid teeth acutish, the lower one longer and acute; petals dark red or maroon; vexillum suborbicular, 10-12 mm. long, yellow or greenish centered, densely silky-strigillose outside with reddish hairs; wing petals oblique-oblong, the claw 2-2.5 mm. long, the blade 7-9 mm. long, slightly strigillose near the base. *Legumes* short-stipitate, strongly compressed, orbicular to broadly ovate-elliptic or oblong, 2.5-4.5 cm. long, 1.5-2.2 cm. wide, rounded or abruptly acute at base and apex, coriaceous, minutely appressed-pilose, ochraceous, 1- or 2-seeded.

British Honduras, Guatemala, Honduras, and Panama.

BOCAS DEL TORO: vicinity of Almirante, *Cooper* 549. CANAL ZONE: near Fort Sherman, *Bailey & Bailey* 213. COLÓN: *Chagres*, *Fendler* 94; along Río Santa Isabel, *Pittier* 4170.

6. *LONCHOCARPUS PENTAPHYLLUS* (Poir.) DC. Prodr. **2**: 259. 1825.—Fig. 142.

*Dalbergia pentaphylla* Poir. in Lam., Encyd. Méth. Bot. Suppl. **2**: 445. 1812.

*Lonchocarpus latifolius* DC., Prodr. **2**: 260. 1825, non *Amerimnum latifolium* Willd. in L., Sp. Pl. ed. 4 [i.e. 5], **3**: 909. 1802.

*Tree* 10-15 m. high. *Leaves* 5- to 9-foliolate; leaflets usually large, ovate to elliptic-oblong, 7-24 cm. long, 4-12 cm. wide, from acuminate to rounded at the base, short-acuminate to subobtuse at the apex, membranous to subcoriaceous, dark green to almost glabrous above, paler and minutely strigillose beneath. *Racemes* solitary in the upper leaf-axils, 5-12 cm. long. *Flowers* with the calyx broadly cupulate, 3 mm. long, minutely but densely sericeous, 5-dentate; petals purplish-red or greenish-purple; vexillum orbicular, truncate at the base, 5-7 mm. long, often yellow-centered, densely tawny silky-strigillose outside; wing petals oblong, short-auriculate, the claw 2.3 mm. long, the blade 5.5 mm. long, sparsely strigillose outside. *Legumes* strongly compressed, elliptic, 4.5-6.5 cm. long, 1.8-2.5 cm. wide, cuneate-attenuate at both ends, submembranous, very minutely sericeous to glabrate.

West Indies, Central and northern South America.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater* 141; Isla Colón, *von Wedel* 100; Fish Creek Hills, vicinity of Chiriquí Lagoon, *von Wedel* 2447. CANAL ZONE: Barro Colorado Island, *Brown* 124. COCLÉ: Bismark above Penonomé, *R. S. Williams* 317. COLÓN: Portobelo, *Dwyer* 5001, Río Indio de Fató, *Pittier* 4269. PANAMA: San José Island, *Erlanson* 57, *Johnston* 1563. SAN BLAS: Permé, *Cooper* 225, 227. VERAGUAS: Isla De Coiba, *Dwyer* 1561.

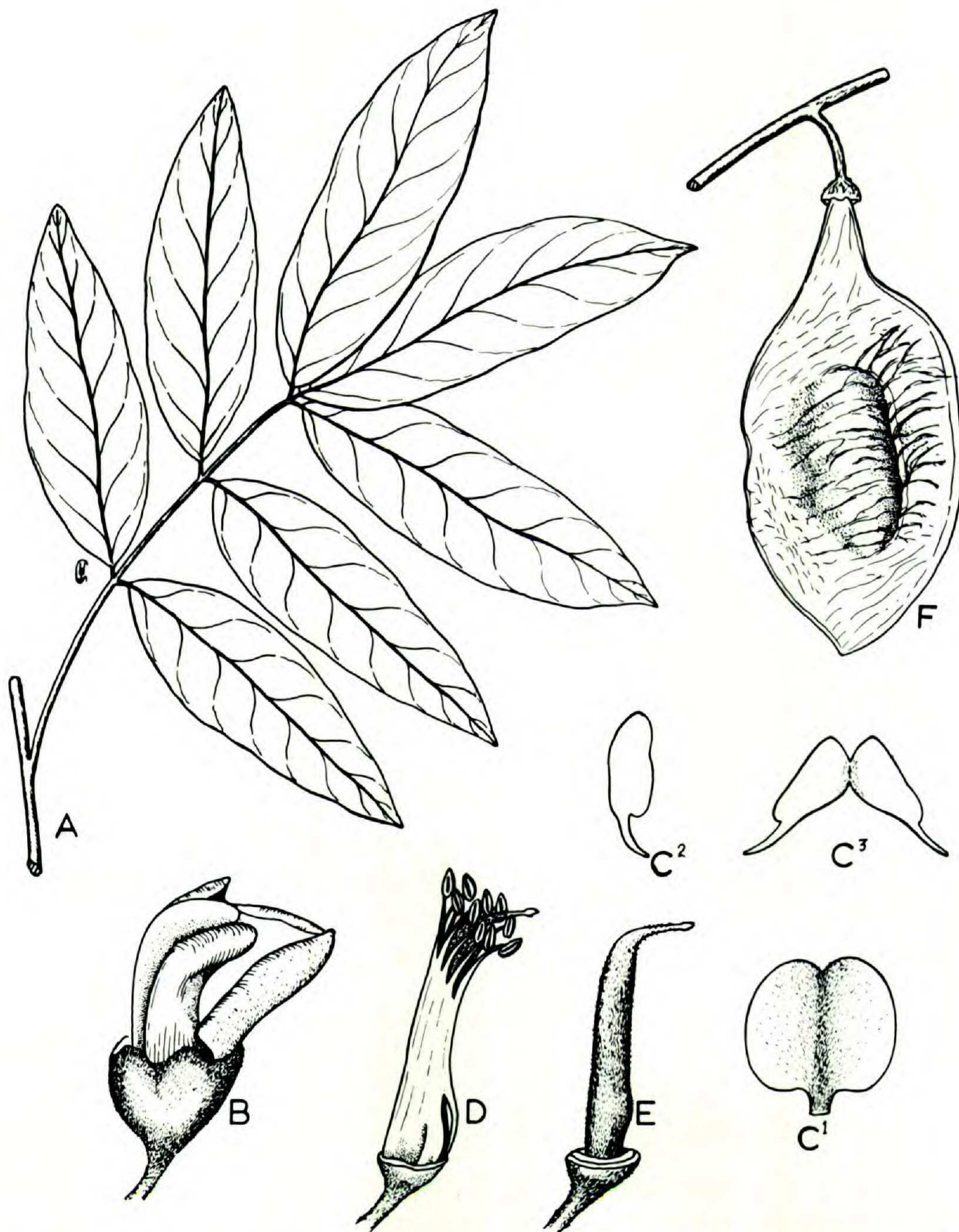


Figure 142. *LONCHOCARPUS PENTAPHYLLUS* (Poir.) DC.: A, leaf ( $\times 1$ ); B, flower ( $\times 7$ ); C, petals ( $\times 4$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium (monadelphous) ( $\times 8$ ); E, pistil ( $\times 8$ ); F, fruit showing seed in outline ( $\times 1$ ). A-E after Johnston 1563 (MO); F after Dwyer 1561 (MO).

As noted by C. O. Erlanson on the label of his collection and by I. M. Johnston (*Sargentia* **8**: 154. 1949), the species is markedly myrmecophilous. Johnston points out (*loc. cit.*) that the dubious name *L. latifolius* should be displaced by the well-founded *L. pentaphyllus*.

7. *LONCHOCARPUS MONOFOLIARIS* Schery, *Ann. Missouri Bot. Gard.* **30**: 89. 1943.

*Tree* 5-13 m. high. *Leaves* 1-foliolate; petioles 8-9 mm. long; leaflets oblong-to oval-elliptic, 14-18 cm. long, 5.5-8 cm. wide, acute to subobtuse at the base, caudate to a narrow blunt apex, subcoriaceous, glabrous, with about 12 prominent

arcuate lateral veins beneath; petiolules 2-3 mm. long. *Flowers* with the calyx very shallowly cupulate to salverform, very shallowly dentate (except for the prominent lowermost tooth), 1.5 mm. long, strigillose; petals lilac to violet-blue; vexillum orbicular, subauriculate at the base, retuse and inflexed at the apex, 8-9.5 mm. long, sericeous without; wing petals narrowly oblong, subfalcate, conspicuously auriculate, the claw 3 mm. long, the blade 7 mm. long, with a broad, sericeous, median band without. *Legumes* stipitate, thin, compressed, broadly oblique-elliptic, 5-7 cm. long and 2.5-3 cm. wide (when 1-seeded), to oblong, 7-8.5 cm. long and 2.5 cm. wide (when 2-seeded), generally abruptly attenuate at both ends, subcoriaceous, pale green, glabrous or very sparsely strigose, prominently veined, the upper margin somewhat thickened and distinctly concave above the seeds.

Costa Rica and Panama.

BOCAS DEL TORO: Water Valley, *von Wedel* 699 (type), 910, 1502; vicinity of Chiriquí Lagoon, *von Wedel* 1027, 1603.

8. LONCHOCARPUS ATROPURPUREUS Benth., Jour. Proc. Linn. Soc., Bot. **4** (Suppl.): 91. 1860.

*Shrub* or tree 3-15 m. high. *Leaves* 5- to 9-foliolate; leaflets ovate-oblong to lanceolate, 2-6.5 cm. long, 1-3 cm. wide, obtuse to cuneate at the base, acuminate to an obtuse apex, subcoriaceous, dark green and glabrous above, paler and puberulent or sericeous beneath. *Racemes* slender, axillary, 1.5-8 cm. long. *Flowers* with the calyx broadly cupulate, 2 mm. long, minutely pubescent, at maturity subentire; petals dark purple or pinkish-purple; vexillum suborbicular, 9 mm. long, the lateral margins inflexed, deeply emarginate and slightly pubescent outside at the apex, otherwise glabrous; wing petals oblong, auriculate, the claw 2.2 mm. long, the blade 7.5 mm. long, glabrous. *Legumes* long-stipitate, compressed, flat, linear-oblong, 4-10 cm. long, 1 cm. wide, obtuse at the apex, glabrous, 1- to 4-seeded.

Southern Mexico, Guatemala, Honduras, Costa Rica, Panama, Venezuela, and Ecuador.

CANAL ZONE: vicinity of Madden Dam, *Allen* 2012, *Stern & Chambers* 160. COLÓN: Río Gatuncillo, vicinity of Santa Rosa, *Allen* 4162.

9. LONCHOCARPUS OLIGANTHUS Hermann, Ann. Missouri Bot. Gard. **36**: 281. 1949.

*Shrub* or slender tree about 10 m. high. *Leaves* 5- to 7-foliolate; leaflets oblong to elliptic, 6-15 cm. long, 2.5-7 cm. wide, rounded or tapering at the base, caudate at the apex, thin-chartaceous, copiously strigose when young, at maturity glabrous or minutely and sparingly strigose beneath, multi-punctate. *Racemes* axillary, slender, subspiciform, loosely flowered, 6-10 cm. long. *Flowers* with the calyx cupuliform, 2.5-3 mm. long, minutely tawny-strigose, the teeth (except the broadly deltoid, carinal tooth) obsolete; petals purple; vexillum broadly oblong to oblong-obovate, 9 mm. long, reflexed, deeply emarginate and somewhat cucullate at the apex, the lateral margins strongly inflexed, copiously silvery-sericeous without; wing petals

oblong, shallowly auriculate, the claw 2.5 mm. long, the blade 6.5 mm. long, glabrous except for a sericeous, median band. *Legumes* unknown.

Costa Rica and Panama.

BOCAS DEL TORO: Garay Creek, vicinity of Chiriquí Lagoon, *von Wedel* 2634 (type).

10. LONCHOCARPUS GUATEMALENSIS Benth., Jour. Proc. Linn. Soc., Bot. **4** (Suppl.): 87. 1860.

*Lonchocarpus darienensis* Pittier, Contr. U. S. Nat. Herb. **20**: 69, fig. 18. 1917.

*Lonchocarpus dumetorum* Brandegee, Univ. Calif. Publ. Bot. **10**: 181. 1922.

*Tree* 3-20 m. high. *Leaves* 5- to 9-foliolate; leaflets elliptic to oblong or ovate, 3.5-11 cm. long, 2-5 cm. wide, subcuneate to rounded at the base, abruptly acuminate to an obtuse apex, subcoriaceous, pellucid-punctate, glabrous. *Racemes* axillary, solitary or fasciculate, 3-14 cm. long. *Flowers* appearing with or before the new leaves; calyx cupulate, 4.5-5.5 mm. long, gray-sericeous; petals pale lavender shading to white toward the claw; vexillum suborbicular, 10-13 mm. long, more or less truncate at the base, emarginate at the apex, sericeous without; wing petals oblong, prominently auriculate, the claw 4.5-5 mm. long, the blade 8 mm. long. *Legumes* stipitate, thin, flat, 7-12 cm. long, 1.5-3 cm. wide, 1- to 3-seeded, narrowed at both ends, glabrous, pale brown, the upper margin dilated and deeply sulcate between the valve-margins.

Mexico (Sinaloa) to Panama.

DARIEN: in forest near sea level around Garchine, *Pittier* 5515 (type of *L. darienensis*).

- 10a. LONCHOCARPUS GUATEMALENSIS var. PROTERANTHUS (Pittier) Hermann, Jour. Wash. Acad. Sci. **39**: 312. 1949.

*Lonchocarpus proteranthus* Pittier, Contr. U. S. Nat. Herb. **20**: 63, pl. 3, B, fig. 11. 1917.

Differing from the typical form in its somewhat larger flowers (13-16 mm. rather than 10-13 mm. long), sparsely sericeous and wider calyx (7 mm. rather than 6 mm. or less), glabrous inflorescence-rachis, and longer secondary peduncles (2-2.5 mm. rather than 0.5-1 mm. long).

Known only from Panama.

COCLÉ: Penonomé and vicinity, *R. S. Williams* 418 (type).

11. LONCHOCARPUS SERICEUS (Poir.) DC., Prodr. **2**: 260. 1825.

*Robinia sericea* Poir. in Lam., Encycl. Méth. Bot. **6**: 226. 1804.

*Lonchocarpus pyxidarius* DC. loc. cit. 260. 1825.

*Lonchocarpus cruentus* Lundell, *Wrightia* **1**: 55. 1945.

*Tree* averaging 10-15 m. in height. *Leaves* 7- to 13-foliolate; leaflets oblong to ovate or obovate, 3-9 cm. long, 2-3.5 cm. wide, rounded at the base, rounded-obtuse or abruptly acuminate to an obtuse apex, coriaceous, minutely pubescent beneath, at least on the midrib and veins. *Racemes* solitary in the upper leaf axils, the rachis

at first velutinous. *Flowers* with large and semipersistent bractlets; calyx cupulate, mostly 4 mm. long, subentire or very shallowly denticulate, densely ferruginous-pubescent; petals rose-pink; vexillum suborbicular, 14-15 mm. long, auriculate at the base, densely silvery-sericeous without; wing petals broadly oblong, very shallowly auriculate, the claw 4.5 mm. long, the blade 10 mm. long, somewhat sericeous without; carina densely sericeous toward the apex; filaments and anthers more or less setose. *Legumes* compressed but thick, 5-12 cm. long, 2.3 cm. wide, somewhat constricted between the seeds, more or less fulvous-pubescent, the vexillar margin carinate and much thickened opposite the 1-5 seeds.

Mexico, Central America, West Indies, northern South America and western tropical Africa.

HERRERA: Santa Maria, *Allen* 791. VERAGUAS: Isla de Coiba, *Dwyer* 1713.

11a. LONCHOCARPUS SERICEUS var. GLABRESCENS Benth., *Jour. Proc. Linn. Soc., Bot.* 4(Suppl.): 88. 1860.

*Lonchocarpus domingensis* DC., *Prodr.* 2: 259. 1825.

*Lonchocarpus lucidus* Pittier, *Contr. U. S. Nat. Herb.* 20: 77, fig. 27. 1917.

Although *L. lucidus* was set off from *L. sericeus* principally on the basis of the lack of a carina on the upper margin of the legumes in the one known fruiting collection, the pods so described are not fully mature and some show a decided tendency toward the development of a carina. The petiolules, moreover, are copiously pubescent, a characteristic of Pittier's section *Carinati* rather than the section *Concavi*. As Bentham pointed out, the least variable characteristic differentiating the plant from *L. sericeus* appears to be the glabrate foliage.

Central America, West Indies, northern South America and western tropical Africa.

COLÓN: along Río Fató, *Pittier* 3879. CANAL ZONE: lake shore along Gatun River Valley, *Pittier* 6508. PANAMA: river valleys near Chepó, *Kluge* 22. DARIEN: Río Chico, vicinity of Yaviza, *Allen* 5089.

12. LONCHOCARPUS CALCARATUS Hermann, *Ann. Missouri Bot. Garden* 36: 282. 1949.

*Tree* 9 m. high. *Leaves* 9- to 11-foliolate; leaflets elliptic-lanceolate, 3.5-11 cm. long, 2-4 cm. wide, cuneate or abruptly acute at the base, obtuse at the apex, epunctate, subcoriaceous, the margin indurated, glabrate above, strigose beneath. *Inflorescences* lateral, paniculate, 25 cm. long, the rachis stout, angular, the flowers in short secondary racemes. *Flowers* with the calyx broadly cupulate, 3.5-4 mm. long, densely sericeous-strigose, the margin subentire in anthesis except for the apiculate 2 lower teeth; petals 16-17 mm. long, pink; vexillum orbicular, 15 mm. long, truncate to shallowly cordate at the base, very sparingly sericeous outside the emarginate apex; wing petals cymbiform, the claw 4.5 mm. long, the blade 11.5 mm. long, very sparsely sericeous without; carinal petals calcarate above the claw. *Legumes* unknown.

Known only from Panama.

COCLÉ: El Vallé, *Allen* 4472 (type).

13. LONCHOCARPUS DENSIFLORUS Benth., Ann. Nat. Hist. **3**: 433. 1839.

*Climbing shrub* or small tree. *Leaves* 7- to 11-foliolate; leaflets ovate to oblong-elliptic, 3-8 cm. long, 2-4 cm. wide, rounded or obtuse at the base, abruptly acuminate, subcoriaceous, dark green and glabrous above, paler and strigillose beneath, the petiolules with filiform stipels at their base. *Racemes* axillary, scarcely longer than the leaves, the rachis stout, terete, the flowers fasciculate. *Flowers* with the calyx cupulate, 4-5 mm. long, shallowly denticulate, densely sordid-strigillose; petals purple to blue; vexillum orbicular, 15 mm. long, cordate at base, the apex slightly emarginate, densely strigillose without; wing petals falcate, auriculate at base; carina strongly arcuate, strigillose along the lower margin. *Legumes* flat, the vexillar suture narrowly carinate.

Panama and British Guiana.

BOCAS DEL TORO: Chiriquí Lagoon: *Hart 99, von Wedel 1405; Almirante, Rowlee & Stork 1002.* CANAL ZONE: vicinity of Mindi, *Allen 5119.*

#### 11. FISSICALYX Benth.

- FISSICALYX Benth., Jour. Proc. Linn. Soc., Bot. **5**: 79. 1861.

*Trees*, unarmed. *Leaves* alternate, imparipinnate, stipulate. *Inflorescences* paniculate, the ultimate branches racemose; pedicels geniculate. *Flowers* with the hypanthium narrow at the base, oblique and cleft on the lower side toward the apex and thus spathaceous, the teeth obsolete; petals free; stamens 10, monadelphous, the sheath cleft above, the filaments short, the anthers monomorphic, dehiscing at first by 2 apical pores; ovary slender, flask-shaped, with 2 basal ovules, the style slender, the stigma minute. *Fruits* bearing broad, lateral wings, 1-seeded.

A monotypic genus known only from Panama and northern South America.

1. FISSICALYX FENDLERI Benth., Jour. Proc. Linn. Soc., Bot. **5**: 79. 1861.—Fig. 143.

*Tree*, small to large, the branchlets puberulent. *Leaves* apparently emerging after the flowers, the leaflets 4-14, usually 9 and opposite, ovate (basal pairs) to elliptic-lanceolate (distal pairs), about 8 cm. long, about 3 cm. wide, membranous, reticulate, glabrescent (except the obviously pubescent costa and margins); petioles 2-10 cm. long; rachises about 15 cm. long, pubescent; stipules lanceolate, often acuminate, the acumen up to 1.5 cm. long. *Panicles* terminal, the branches slender, racemose, the pedicels about 6 mm. long, hirsute; bracteoles proximal to the calyx. *Flowers* with the hypanthium inequilaterally fusiform in the bud, later tubular, the limb elliptic, spathaceous, about 10 mm. long, hirsute; vexillum orbicular, about 12 mm. long, complicate, briefly unguiculate, somewhat arachnoid-villose near the tips; stamens with the sheath about 9 mm. long, the filaments up to 2 mm. long, the anthers oblong, 1-1.3 mm. long, dehiscing by paired, terminal pores later extending to lateral slits; ovary stipitate for about 2 mm., narrowly oblong, about 4 mm. long, densely pubescent, the style about 10 mm. long. *Fruits* flat, subrotund,



Figure 143. *FISSICALYX FENDLERI* Benth.: A, leaf and inflorescence ( $\times 1$ ); B, fruit showing seed in outline ( $\times 1$ ). After Allen 4274 (MO).

5-6 cm. long, 4-5 cm. wide, tapering gradually and ultimately truncate and often retuse at the tip, the wings lightly pubescent; seeds about 1.7 cm. long, reddish-brown.

Known from Panama, the Guianas, and Venezuela.

CANAL ZONE: Gamboa, Allen 4274; Summit Road, Jones 271.

A rather striking tree with orange-yellow flowers, evidently flowering at the end of the dry season in Panama (March). The two collections cited above probably represent the first report of the species in Central America. The spathaceous calyx is not found in any other species of the Panamanian *Dalbergieae* and the poricidally dehiscent anthers are probably unique for the *Papilionoideae*.



## 12. GEOFFROEA Jacq.

GEOFFROEA Jacq., Sel. Stirp. Am. Hist. 207. July, 1763.

*Geoffraea* L., Sp. Pl. ed. 2, 1043. August, 1763.

*Vouacapoua* Aubl., Hist. Pl. Gui. Fr., Suppl. 9, t. 373. 1775.

*Andira* A. L. Jussieu, Gen. Pl. 363. 1789.

*Trees*, small or large. *Leaves* with 7-15 leaflets pinnately disposed; stipelles linear or subulate, deciduous; stipules small, subulate, caducous. *Panicles* or racemes terminal; bracts and bracteoles small, soon deciduous. *Flowers* with the vexillum mostly suborbicular, auriculate at the base, the claw abrupt, short; wing and carinal petals similar, transversely gibbous and auriculate near the base, conspicuously clawed; stamens usually monadelphous, the anthers versatile; ovary stipitate, oblong, the style cylindrical, the stigma small, capitate. *Fruits* drupaceous, ovoid, the endocarp woody, indehiscent, the seed solitary.

A small genus limited to the tropics of the New World.

The genus *Geoffroea* Jacquin (1763) which predates Aublet's genus (1789) has for its type *G. spinosa* and may include the concept of *Andira*, a *nomen genericum conservandum* over *Vouacapoua*. Jacquin's genus was published a month before Linnaeus' *Geoffraea*. That Linnaeus was influenced by the writings of Jacquin is well-known (cf. A. Robyns' note on *Bombax ceiba* L. in *Taxon* **10**: 159. 1961). Linnaeus, unfortunately on occasions misspelled Jacquin's names.<sup>5</sup> According to Article 14, note 3 (International Code of Botanical Nomenclature, *Regnum Vegetabile* **23**: 15. 1961) ". . . When a conserved name competes with one or more other names based on different types and against which it is not explicitly conserved, the earliest of the competing names is adopted in accordance with Art. 57." Thus as *Geoffroea* Jacq. is a non-competing and earlier name, the valid name of the species is: *Geoffroea inermis* W. Wright.

While a substantial argument may be offered for segregating *A. inermis* from *Geoffroea* on the basis of fruit characters I do not regard the evidence as substantial enough. True, the description and the figure of the fruit of Jacquin's *G. spinosa* (loc. cit.) shows that the pericarp has a median longitudinal sulcus which is not found in *A. inermis*. The drupaceous and monospermate fruit of *Geoffroea* has a subovate pericarp which is described as "notata utrinque sulco longitudinali in latere autem compressiusculo. . . ."

1. GEOFFROEA INERMIS W. Wright, Lond. Med. Jour. **8**: 256. 1787.—Fig. 144.

*Geoffraea jamaicensis inermis* Wright, Phil. Trans. Roy. Soc. London **67**: 512, t. 10. 1778.

*Andira inermis* (W. Wright) H. B. K., Nov. Gen. Sp. Pl. **6**: 385. 1824.

*Andira excelsa* H. B. K., loc. cit. 385. 1824.

*Pterocarpus sapindoides* DC., Prodr. **2**: 419. 1825.

<sup>5</sup> Linnaeus is not to be judged too harshly for his misspelling when one considers that Jacquin altered his name *Goffroea* to *Goeffroea* in a matter of two lines, loc. cit. 207. The majority of taxonomists prefer *Geoffroea*.

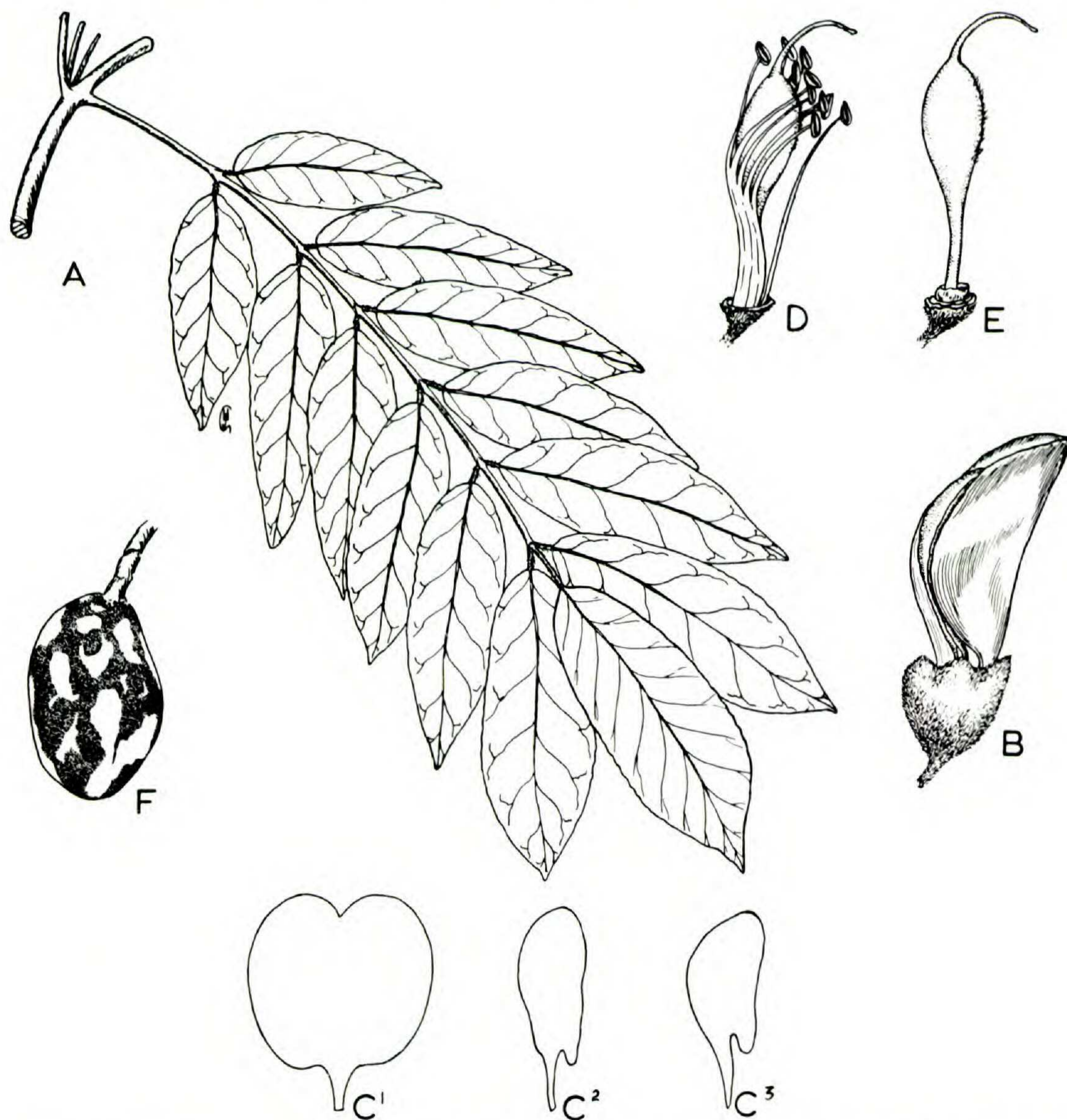


Figure 144. *GEOFFROEA INERMIS* W. Wright: A, leaf ( $\times 5$ ); B, flower ( $\times 5$ ); C, petals ( $\times 4$ ), C<sup>1</sup>, vexillum, C<sup>2</sup>, wing, C<sup>3</sup>, carina; D, androecium (diadelphus) and gynoecium ( $\times 6$ ); E, gynoecium ( $\times 1$ ); F, fruit ( $\times 1$ ). A-E after *Standley 21796* (MO); F after *Broadway s. n.* (MO).

*Andira sapindoides* (DC.) Benth., Jour. Proc. Linn. Soc., Bot. **4** (Suppl.): 123. 1860.

*Andira inermis* var. *sapindoides* (DC.) Griseb., Fl. Brit. W. Ind. 202. 1860.

*Vouacapoua inermis* (W. Wright) Lyons, Plant Names Scientific and Popular 396. 1900.

*Andira jamaicensis* (W. Wright) Urb., Symb. Ant. **4**: 298. 1905.

*Andira chiricana* Pittier, Contr. U. S. Nat. Herb. **18**: 235. 1917.

*Tree*, small. *Leaves* with 7-15 leaflets, these oblong, 2.5-13 cm. long, 1.5-5 cm. wide, variable at the apex, often acuminate for 1.5 cm., chartaceous to subcoriaceous, glabrescent to minutely puberulent along the costa, the latter slender, immersed above, the main veins about 10, the margins subrevolute and usually vaguely crisp; petiolules up to 0.5 cm. long; stipelles subulate, up to 0.6 cm. long; petioles 2-3 cm. long, puberulent; rachises 8-13.5 cm. long; stipules broadly subulate, 0.2-1.0 cm. long, stiff, curled, puberulent. *Panicles* often exceeding the uppermost leaves, the rachises 10-25 cm. long, the basal branches 4-15 cm. long, usually with the secondary branches up to 3 cm. long, twisted, rough with pedicel scars, densely aurous-

puberulent; bracts ovate, about 3 mm. long. *Flowers* subsessile, about 10 mm. long, the hypanthium obliquely campanulate, 3-4 mm. long, thinly carnose, minutely ferruginous-tomentose, glabrous within, the teeth subequal, obscurely or widely triangular, up to 2 mm. long; wing and carinal petals oblong or subreniform, about 6 mm. long, the claw about 3.5 mm. long, thinly carnose, glabrous; staminal sheath about 5 mm. long, gibbous near the tip, glabrous, the filaments up to 3 mm. long, the anthers about 1 mm. long; ovary stipitate for 4-5 mm., elliptic to narrowly obovate, about 3.5 mm. long, sparsely pilose to glabrous, 2- to 3-ovulate, the style subulate, 3.5 mm. long, more attenuate above. *Fruits* obliquely oval, 2.5-5 cm. wide, liginous.

Common in the tropics of the New World; apparently introduced into parts of East Africa.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater* 147; Progreso, *Cooper & Slater* 265. CANAL ZONE: Ancón, *Lindsay s.n.*; Barro Colorado Island, *Aviles* 920, 981, *Bailey & Bailey* 52, *Bangham* 393, 432, *Dwyer* 1469, *Kenoyer* 679, *Killip* 40032, *Salvoza* 880, 886, *Shattuck* 375, 393, *Starry* 205, 227, *Wetmore & Abbe* 42, 143, 151, *Woodworth & Vestal* 368, 444; Ancón, *Mason* 13; France Field, *Mason & Valentine* 7044; Trinidad River, *Pittier* 3999; Navy Pipeline Road, northeast Gamboa Bridge, *Stern* 19. COCLÉ: Río Fató, *Pittier* 3870; El Vallé, *Allen* 1770. DARIEN: El Real, *Duke* 4926.

*A. inermis*, a common tree in Panama, has conspicuous purple flowers and plump-drupaceous fruits. The fetid bark surrounds a hard wood varying in color from yellow to black; it is used in heavy construction and in ornamental boxes; medicinally the bark is used as a vermifuge and purgative (cf. *Standley, Contr. U. S. Nat. Herb.* **27**: 218. 1928). In very heavy doses it is a potent poison. Apparently the seeds are poisonous. *Johnston (Sargentia* **8**: 146. 1949) has interesting notes on flower color: "The standard is usually pink or almost magenta toward the margin, deepening in color and becoming brownish-red about the white center." In addition he appends a lengthy discussion of the nomenclatural history of *A. inermis*. The vernacular name is *cocu*.

I have elected to reduce *A. sapindoides* (DC.) Benth. to synonymy since the only character which may be used to distinguish it is completely glabrous pistil. Numerous dissections of the *A. inermis* complex reveals that there is a great reduction in the indumentum of the ovary, thus suggesting that this is not a strong distinguishing feature.

### 13. **OLEIOCARPON** Dwyer, gen. nov.

*Arbores. Folia* imparipinnata jugis foliolorum pluribus oppositis vel approximatis; rhachides saepe alati; stipellae nullae; stipulae minutae caducaeque. *Flores* in crebros terminales racemos conjugati; bracteae parvae deciduaeque; bracteolae 2 calycis maioribus lobis similes et gemmas juveniles valvatim includentes; hypanthium campanulatum, bilabiatum dentibusque (aut lobis) superioribus 2 multo maioribus longioribusque quam dentibus 3 inferioribus, glandulo-punctatum; vexillum subrotundatum, emarginatum; alae carinae petalaeque, oblongae, obtusae, alis apice inaequilateraliter bilobatis; stamina 10 monadelphia filamentis alternatim in-

aequilateralibus; ovarium stipitatum, glabrum, stylo breve crasso stigmatique capitato. *Fructus* drupacei, primo pubescentes, indehiscentes, oleaginei monospermatique.

Type species: *Oleiocarpon panamense* (Pittier) Dwyer.

The segregation of this species as a new genus seems justifiable on the grounds that the fruits are obviously structurally different from those of *Coumarouna* Aubl. (Hist. Pl. Gui. Fr. 740. 1775), and the conserved *Dipteryx* Schreb. (in L., Gen. Pl. ed. 8, 485. 1791) (cf. discussion below), although the flowers are strikingly similar. The drupaceous fruits, suggesting the section *Geoffroyeae* of the *Dalbergieae* are pubescent when immature and secrete oil. Ducke, in 4 papers (Arch. Jard. Bot. Rio de Janeiro **3**: 142, 162-164. 1922, **4**: 72. 1925; Rev. Bot. Appl. Agric. Trop. **14**: 400-407. 1937; Notiz. Bot. Gart. Berlin **14**: 120-127. 1938) dealing with the genus *Coumarouna* (*Dipteryx*), concludes that *Coumarouna panamensis* was not rightly assigned to the genus, maintaining that the fruits are more like those of *Pterodon*. While they resemble those of *Pterodon* in being oleaginous, they are obviously different in several important respects. The fruit of *Coumarouna* is indehiscent, plump and fleshy, while the fruit of *Pterodon* is thin with the endocarp splitting into valves at maturity. Important too, are differences in foliage, noted a century ago by Bentham (Jour. Proc. Linn. Soc., Bot. **4** (Suppl.): 25-26. 1860): “. . . the leaflets being few, large, and coriaceous in *Dipteryx*, more numerous, smaller, and thinner in *Pterodon*.” Pittier, the author of *Coumarouna panamensis*, was skeptical about his choice of genus, remarking in his type description: “. . . it is therefore probable that these species (including *C. panamensis*) ought to represent a new genus, intermediate between *Coumarouna* and *Pterodon*.”

The segregation of *C. panamensis* as the type of the new genus serves to by-pass the problem of its original assignment to the genus *Coumarouna* and its subsequent transfer to *Dipteryx* by Record & Mell (Timbers Trop. Am. 303. 1924). *Dipteryx* according to the International Rules, is conserved over *Coumarouna*. This decision, favoring *Dipteryx*, however, apparently assumes that the genus *Taralea* Aubl. (loc. cit. 745. 1775) is included in *Coumarouna*. Ducke in several papers e.g. Trop. Woods **61**: 1-10. 1940) presents convincing evidence that *Taralea* is distinct from *Coumarouna* and maintains that *Coumarouna* deserves to be restored to a state of validity and that *Dipteryx* be invalidated.

1. **OLEIOCARPUS PANAMENSE** (Pittier) Dwyer, comb. nov.—Fig. 145.

*Coumarouna panamensis* Pittier, Contr. U. S. Nat. Herb. **18**: 236. 1917.

*Dipteryx panamensis* (Pittier) Record & Mell, Timbers Trop. Am. 303. 1924.

*Tree*, tall. *Leaves* with 24-28 leaflets, the uppermost pair usually located 1-3 cm. below the tip of the rachis, the lowermost pair apparently opposite, with the bases contiguous on the upper side of the rachis, oblong, up to 21 cm. long, up to 8 cm. wide; petiolules up to 0.9 cm. long; petioles about 8 cm. long, up to 0.8 wide, swollen at the base, involute; rachises up to 37 cm. long, alate, papillate, glabrous; stipules caducous. *Panicles* terminal, up to 40 cm. long, the branches patulous,

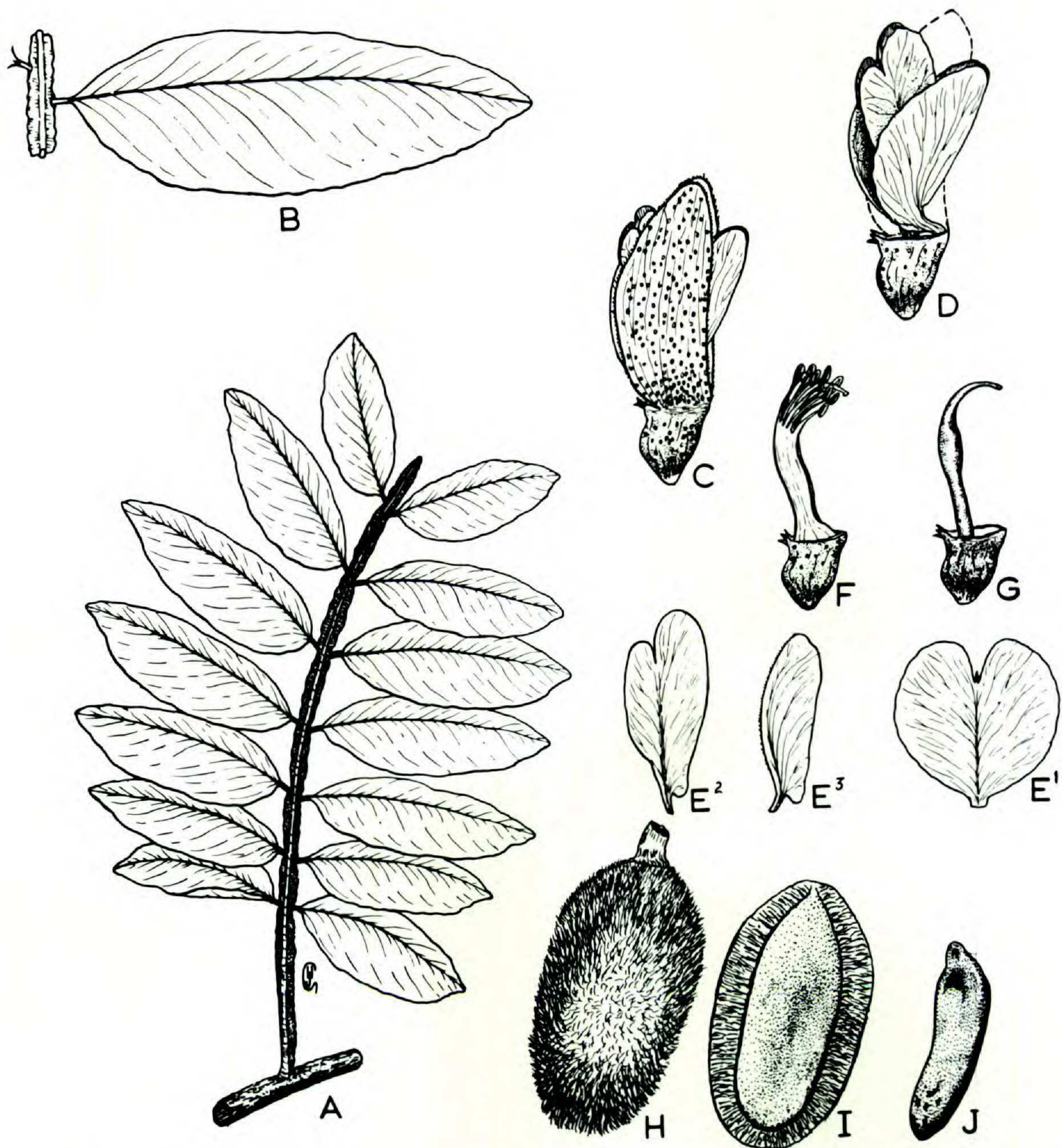


Figure 145. *OLEIOCARPON PANAMENSE* (Pittier) Dwyer: A, leaf ( $\times \frac{1}{2}$ ); B, leaflet ( $\times 1$ ); C, flower ( $\times 3$ ); D, flower with a calyx lobe removed ( $\times 3$ ); E, petals ( $\times 3$ ), E<sup>1</sup>, vexillum, E<sup>2</sup>, wing, E<sup>3</sup>, carina; F, androecium (monadelphous) and receptacle cup ( $\times 3$ ); G, pistil ( $\times 3$ ); H, fruit, surface view ( $\times 1$ ); I, fruit in hemisection, internal view, without seed ( $\times 1$ ); J, seed ( $\times 1$ ). A-G after Stern, Chambers, Dwyer & Ebinger 973 (MO); H-J after s. coll. s. n. (US 866002).

arcuate, pubescent; pedicels 4-5 mm. long, expanded at the apex. *Flowers* with the hypanthium about 10 mm. long, with 2 very conspicuous oblong lobes, 8-20 mm. long, up to 4 mm. wide, obtuse, puberulent within, glandular-punctate, the remaining 3 lobes (teeth) minute, falcately uncinata, up to 1 mm. long, the margins irregular at the apex lanulose within; vexillum subsessile, rotund, 6-10 mm. long, emarginate, often with a conspicuous tooth in the sinus, subobtuse and carinose at the base; carinal petals inequilaterally oblong, up to 6.5 mm. long, 3-6 mm. wide, puberulent along the lower margin, a conspicuous vein paralleling the lower margin; stamens with the sheath 8-14 mm. long, glabrous, the filaments subequal, up to 3.5 mm. long, the shorter anthers about 0.5 mm. long, the longer anthers about 0.7 mm. long; pistil flat, about 4 mm. long, the style about 2 mm. long, glabrous, the stigma truncate. *Fruits* pedicellate for about 1.5 cm.; plump, drupaceous, oleaginous, elliptic, about 6 cm. long, about 3 cm. thick and wide, obtuse, at first with a gray-green pubescence, the hairs soon deciduous; seed somewhat flat, almond-shaped, about 5 cm. long, about 1.5 cm. wide, light brown.

Known only from Costa Rica, Panama, and Colombia.

BOCAS DEL TORO: Chiriquí Land Co., 11 m. west of Almirante, *Stern* 108; Water Valley, Chiriquí Lagoon, *von Wedel* 757. CANAL ZONE: Barro Colorado Island, *Bailey & Bailey* 71, *Fairchild s. n.*, *Standley* 31439, 41074; Trinidad River, *Pittier* 4033. DARIEN: headwaters of Río Chico, *Allen* 4608; Boca de Pauarando on Sambu River, *Pittier* 5257; El Real, *Stern, Chambers, Dwyer & Ebinger* 973. PANAMA: La Chorrera, *Allen* 3612; Arraijan, *Cook & Martin* 45; Arenoso, lower Río Trinidad, *Seibert* 619.

When in flower the tree is one of the most attractive in the forest, its crown of terminal panicles dense with pink-purple blossoms readily visible at considerable distances from the rivers. The flowers persist for weeks; on falling to the forest floor they attract leaf-cutting ants. The wood is extremely hard and is avoided by axe-men. According to Standley (under the name of *Coumarouna panamensis*, *Contr. U. S. Nat. Herb.* **27**: 219. 1928), as the fruits dry their oily liquid crystallizes. Apparently the kernels of the seeds may be eaten before roasting. The vernacular name is *almendro*. The fragrant seeds are known as *tonka beans*.

Marsh, in his "White Indians of Darien" (96-97. 1934), observed that the Indians used the fruits to make torches: "they consist of about 20 nuts of the *almendra* tree, rather like nutmegs in shape and size. They are strung tight against each other on a long sliver of black palm and give a light about as bright as a common kerosene lantern. As one nut is consumed, it lights up the next one. . . . Each nut burned for about 5 minutes."

(to be continued)